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Economic Incentives and Disincentives for
Recycling of Municipal Solid Waste

Franklin Associates Ltd., Prairie Village, KS

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ECONOMIC INCENTIVES AND DISINCENTIVES
FOR RECYCLING OF
MUNICIPAL SOLID WASTE

Prepared for
THE CONGRESS OF THE UNITED STATES,
OFFICE OF TECHNOLOGY ASSESSMENT

By
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Abstract: The purpose of the study is to identify and analyze various Federal government policies that may discourage or act as disincentives to the recycling of materials from municipal solid waste. The study primarily evaluates economic policies, but also examines tax policies and their potential effectiveness in reducing or eliminating the barriers to recycling. The report is prepared as an internal document to be used by the Congress of the United States, Office of Technology Assessment (OTA) in their assessment of municipal solid waste. The report organization follows the scope of work as defined by OTA: Chapter 1 - Federal Subsidies for Virgin Materials; Chapter 2 - Federal Subsidies for Recycled Materials; Chapter 3 - Federal Subsidies for Alternative Energy Sources; and Chapter 4 - State Tax Incentives.

PREFACE

This study was carried out for the Congress of the United States, Office of Technology Assessment, Contract No. J3-3195.0, in their evaluation of municipal solid waste management. The study was completed by Franklin Associates, Ltd. and the Center for Economic Policy Analysis. The purpose of this study was to identify and analyze various Federal government policies that may act as disincentives to recycling and to evaluate options to overcome such disincentives.

The study is prepared as a background document to OTA in their research efforts. This report is divided into an Executive Summary and four chapters. These chapters examine Federal subsidies to virgin materials, the potential for Federal subsidies for recycled materials, Federal subsidies for alternative energy sources, and state efforts at increasing recycling through tax incentives.

The principals of each were involved in this study: William Franklin, Franklin Associates, Ltd. and Art Lyons, Center for Economic Policy Analysis. The study was completed under the direction of Jere Sellers, project leader, Franklin Associates, Ltd.. Contributions were also made by Robert Hunt, Robert Yoos, and Marge Franklin, Franklin Associates, Ltd. and Spenser Staton from the Center for Economic Policy Analysis.

We gratefully acknowledge the cooperation of industry and government representatives during this investigation. We also would like to thank the Office of Technology Assessment for their guidance and direction during this study.

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EXECUTIVE SUMMARY

The purpose of this study is to identify and analyze various Federal government policies that may discourage or act as disincentives to the recycling of materials from municipal solid waste. The study primarily evaluates economic policies, but also examines tax policies and their potential effectiveness in reducing or eliminating the barriers to recycling.

This report is prepared as an internal document to be used by the Congress of the United States, Office of Technology Assessment (OTA) in their assessment of municipal solid waste. The report organization follows the scope of work as defined by OTA:

- Chapter 1 - Federal Subsidies for Virgin Materials
- Chapter 2 - Federal Subsidies for Recycled Materials
- Chapter 3 - Federal Subsidies for Alternative Energy Sources
- Chapter 4 - State Tax Incentives

Results of the study are summarized on the following pages.

BACKGROUND

Over the years a number of studies dealing with disincentives for recycling have been performed. Several of these studies were performed in the mid-to-late 1970s when recycling was last a focus of attention of government policy makers. A major objective of this study was to evaluate the

findings from earlier reports and discuss them with respect to current conditions. While the methodologies used in these earlier reports were examined it was not within the scope of this study to critically review each methodology.

Besides utilizing literature sources the project team also drew upon personal knowledge of the recycling industry and sought industry input on the areas of concern. By evaluating data from all these sources and paying close attention to the recent tax changes brought about by the Tax Reform Act of 1986, our results met the objective of describing current conditions.

The last point to be made before discussing the results concerns the definition of recycling. In this study recycling encompasses more than just the recovery of materials from the waste stream. Recycling in this report refers to recovery, processing, and secondary material utilization. Therefore, the barriers and incentives for recycling cover all aspects from material recovery through to product utilization.

BARRIERS OR DISINCENTIVES FOR MATERIALS RECYCLING

In order for the Federal government to encourage recycling, they must first understand the barriers or disincentives facing secondary materials recycling. The emphasis in this study is on economic factors. Before examining the economic factors aiding industries or materials which compete against recycling, it is useful to look at the general conditions facing material recycling.

Supply and Demand

Generally, the recycling of individual materials can be classified as either in a demand-limited or a supply-limited situation or both. Table ES-1 illustrates the limiting areas for each recycled material and also identifies the optimum point for applying incentives.

A demand-limited situation indicates insufficient consumer demand if additional recovery occurs. For example, old newspapers (ONP) are considered demand-limited because the two major markets for ONP (recycled paperboard and newsprint) are limited in their ability to consume increased quantities of ONP because of limited secondary demand. Efforts to overcome these limitations should be focused at stimulating end user and consumer demand.

A supply-limited situation indicates insufficient recovery or supply of materials for end markets. For example, glass scrap or cullet is supply-limited because end markets, such as glass container plants, appear willing and able to consume increased amounts of cullet. Therefore, efforts to overcome limitations for these materials should focus on collection and processing capabilities. Understanding the relationships between each material and its barriers are important in defining options to overcome those barriers.

The driving forces determining whether materials are supply- or demand-limited are both economic and noneconomic. Economic factors limit markets through economic forces.

Noneconomic factors include attitudes of manufacturing personnel or of end product consumers, attitudes on quality control, vertical integration into virgin material industries, and long-

Table ES-1

LIMITING AREAS FOR MATERIALS RECYCLING
AND APPROPRIATE LEVELS FOR APPLYING INCENTIVES

<u>Materials</u>	<u>Limiting Areas</u>		<u>Optimum Points for Incentives</u>		
	<u>Supply</u>	<u>Demand</u>	<u>Collection/ Processing</u>	<u>Mills</u>	<u>Industrial/ Commercial Consumer</u>
Old newspapers		X		X	X
Old corrugated containers	X		X	X	
Office papers	X		X		
Mixed papers		X		X	X
Plastics	X	X	X	X	X
Glass	X		X		
Tin cans	X		X		
Aluminum	X		X		
Used oil		X		X	X
Tires		X		X	X

Source: Franklin Associates, Ltd.

standing policies and procedures. The emphasis of this study focuses on those factors which are more amenable to correction by Federal policies and thus is directed at economic factors.

Economics

Two subsidy programs were examined in this study to determine their effect on recycling. The programs evaluated focused on advantages for virgin materials and alternative energy sources.

Virgin materials. Historically, subsidies for virgin materials have fallen under two major categories: 1) percentage depletion allowances for mineral mining and petroleum production; and 2) special treatment of income for the production of timber. Investigating these programs revealed that even with recent tax changes such as the Tax Reform Act of 1986, significant Federal subsidies exist for these industries or materials. The size and variability of these programs are illustrated in Table ES-2. This table shows that each of these programs are currently at or near their ten-year low, but still total over one billion dollars. There has been some concern about the data reported by the Budget Office. The reported values for any one year change with each Fiscal Year report. These discrepancies are noted in the detailed discussion in Chapter 1; however, without any better data the Budget values can be used as long as they are treated as rough estimates of true values.

While the values presented in Table ES-2 are significant amounts, it should be noted that spreading these amounts out over the entire virgin or recycled production result in minimal effect on either component. For the virgin system the subsidy affected the selling price of the virgin material by less than 5 percent. In turn, this meant less than 2 percent of the recycled materials market were affected by the subsidy. These results are based on earlier detailed analysis when subsidy programs were much higher than the current level. Therefore, it

was concluded that the impact of these Federal programs are not markedly different, and may be lower, than those earlier reported (of less than 2 percent prior to the Tax Reform Act of 1986). This small impact has not been reported by the recycling industry to hinder or constrain their growth.

Alternative energy sources. The Public Utilities Regulatory Policies Act of 1978 (PURPA) and the Federal tax codes which took effect in the early 1980s, significantly improved the economic feasibility of waste-to-energy facilities. The area where waste-to-energy appears favored over recycling is government financing, and should in no way be construed to affect the political atmosphere. Both recycling and waste-to-energy and viable options which are compatible together.

Table ES-2

ESTIMATED COSTS OF SELECTED FEDERAL PROGRAMS
WHICH PROVIDE PREFERENTIAL TAX TREATMENT
TO VIRGIN MATERIALS PRODUCTION 1/
(Millions of dollars)

<u>Fiscal</u> <u>Year</u>	<u>Virgin Materials</u>			<u>Total</u>
	<u>Minerals</u>	<u>Timber</u>	<u>Oil/Gas</u>	
1980	548	740	5,021	6,309
1981	563	756	6,075	7,394
1982	519	820	6,095	7,434
1983	638	864	4,582	6,084
1984	698	1,046	3,750	5,494
1985	610	663	2,178	3,451
1986	618	747	2,575	3,940
1987	455	630	355	1,440
1988	352	468	343	1,163
1989	330	474	446	1,250

Source: Budget of the United States for Fiscal Years 1982, 1983, 1984, 1985, 1986, 1987, 1988, and 1989. For details see Table 1-1 of this report.

1/ Presented in constant dollars with 1987 as the basis.

The first form of funding for waste-to-energy is bonding. In this case municipal tax-exempt financing may be used for solid waste processing facilities, such as a waste-to-energy or refuse-derived fuel (RDF) plants. However, material recycling operations that process source separated waste, such as intermediate processing centers (IPCs) or material recovery facilities (MRFs) do not appear eligible for such funding. The distinction appears to be based on the fact that mixed recyclables entering an IPC or MRF has value, while solid waste entering a waste-to-energy facility has a zero or negative value.

The second type of financing which favors waste-to-energy is the price paid by a utility for electricity (typically based on avoided cost). Each state determines what is to be included in determining avoided costs. Therefore, avoided costs themselves do not constitute a subsidy; however, in the cases where utilities must pay waste-to-energy facilities more than the avoided cost for their electricity, this payment above the avoided cost could be considered a subsidy. It is an advantage for a waste-to-energy operation to receive higher amounts for the electricity they generate, but it may encourage the incineration of more recyclables.

OPTIONS TO OVERCOME BARRIERS FOR MATERIAL RECYCLING

Various approaches are available by which governments can improve conditions for recycling by lessening barriers. For example, on the state level a variety of tax programs have been implemented in hope of spurring recycling efforts. These state

programs include investment tax credits on recycling equipment, property tax exemptions, and sales tax exemptions. Another program only proposed at this time would provide a tax credit to users of recycled materials.

In general, these programs have not been analyzed through a strict cost-to-benefit analysis and therefore, it is difficult to determine if increased recycling activity has occurred as a direct result of state tax incentives. Without such an analysis the effectiveness of state tax programs for stimulating recycling is difficult to accurately measure.

State taxes paid by individuals or corporations are relatively small when compared to other business expenses. Therefore, arguments indicate that lowering state taxes would, at best, have only a minimal effect on business decisions. However, lowering the Federal taxes may have a greater impact on business decisions. With this premise in mind, this study examined possible changes in Federal policies that could improve conditions for recycling. The following conclusions summarize the analysis of Federal economic and noneconomic policies to overcome barriers to recycling:

1. The level at which financial support is applied is vital in observing the greatest cost-to-benefit. The major distinction can be made between supply and demand limited materials. The majority of tax incentives aimed at recycling have focused on the

supply side or increasing the recovery. Limited effort has been exerted at improving conditions on the demand side.

Therefore, for those materials which have economic barriers and are supply limited, efforts should focus on material recovery. On the other hand, for those materials which have economic barriers and are demand limited efforts, should focus on industrial, commercial, and individual consumers of recycled products. These consumers are not necessarily the mills who purchase scrap materials, but instead, the people who buy the mills' finished products. By utilizing economic leverage at different levels, (supply end or demand end) for each material, should improve the overall effectiveness of the program.

2. Many recycling industries indicate they want and would use tax incentives if available. However, there is no evidence that these incentives will result in increased recycling.

This can be attributed to several factors:

- Business taxes are relatively small when compared to other business expenses.
- Taxes are only one of the factors considered in expansion or growth decisions, but not the major factor.

- Some recycling businesses pay little or no taxes, thus businesses which could most benefit from tax credits do not have a significant enough liability.
- Tax incentives are difficult to target and sufficiently monitor when trying to determine if the program is meeting its goals or objectives.

Therefore, in order to overcome economic barriers, government policies other than tax incentives should be considered.

3. Where economic inadequacies toward recycling are identified, the use of direct subsidies appear to be more cost effective than tax incentives because of their ability to be targeted for specific results. However, by their nature, subsidies of any form create inequities between competing groups and, therefore, may be difficult to implement.
4. Although economic considerations are important to recycling, noneconomic barriers also exist. In these cases programs aimed only at the economics of recycling will not be effective. Additional analysis of noneconomic factors should be performed.

5. Proposed Federal recycled procurement guidelines should be quickly implemented and the results widely communicated. Additional Federal guidelines should be considered to broaden the coverage of materials and products.

Chapter 1

FEDERAL SUBSIDIES FOR VIRGIN MATERIALS

Over the years various studies have been made with the objective to identify and quantify federal subsidies for virgin materials. Transportation rates, product labeling, and tax advantages such as depletion allowances and capital gains have been the most widely-identified programs reported to result in a disincentive to secondary material use. This analysis will focus only on the tax code provisions that encourage virgin material development. The findings are based on communications with government/industry representatives and evaluation of detailed studies of the tax programs. Recent tax code changes were considered when evaluating these earlier studies.

The discussion on the following pages focuses on percentage depletion allowances, and special treatment of income (formerly called capital gains). These two tax preferences were identified as having the largest budgets of the programs which encourage virgin materials development.

BACKGROUND ON FEDERAL TAX CODES

Programs which stimulate or subsidize the development of natural resources have long been criticized by many conservationists and environmentalists. The basic argument is that subsidizing the cost of virgin raw materials has hindered the growth of secondary materials markets. For example, the argument is that depletion allowances for mineral mining and

petroleum production affect the markets for recovered steel, glass, aluminum, copper, plastics, and re-refined oil. Likewise tax preferences to the timber industry are reported to stimulate or subsidize the production of wood pulp for paper manufacture.

The history of the tax preference programs for natural resources dates back to the early part of this century when the development of natural resources were sought to fuel economic development in the United States. The difficulty with long-standing programs such as this is that they have become so embedded in the economic system that the programs are now an integral part of the industrial infrastructure and economics of natural resource development and production. A summary of the federal expenditures for natural resources tax programs are presented in Table 1-1. The amounts presented are in constant dollars with a 1987 basis.

The values presented in Table 1-1 are tax costs taken from the Budget of the United States. These values appear to fluctuate from year to year in the budget reports. For any one year the budget presents values for three years (e.g., the Budget for FY1989 presents values for 1987, 1988, and 1989). Therefore, in an effort to eliminate these yearly discrepancies the project team used the most recent budget reports to present data. For instance, to present values for 1980, the Budget for FY1982 was used. By using this methodology the project team hoped to report actual and not predicted expenses. Even by taking this precaution there is still some question as to whether these values

Table 1-1

ESTIMATED COSTS FOR SPECIAL TAX TREATMENT FOR VIRGIN MATERIALS PRODUCTION, FISCAL YEARS 1980 TO 1989 1/

(Millions of dollars)

	FY80	FY81	FY82	FY83	FY84	FY85	FY86	FY87	FY88 2/	FY89 2/
Natural Resources and Environment:										
Expensing of exploration and development costs, nonfuel minerals	27	31	30	62	65	85	88	35	34	37
Excess of percentage over cost depletion, nonfuel mineral	493	506	466	531	589	493	500	410	318	293
Capital gains treatment of iron ore	21	25	24	45	44	32	31	10	-	-
Subtotal - Minerals	548	563	519	638	698	610	618	455	352	330
Capital gains treatment of certain timber income	740	756	808	831	997	610	690	290	10	-
Expensing of multi-period timber growing costs	-	-	-	-	-	-	-	130	256	279
Investment credit and seven-year amortization for reforestation expenditures	-	-	12	34	49	53	57	210	203	195
Subtotal - Timber	740	756	820	864	1,046	663	747	630	468	474
Total - Minerals and Timber	1,288	1,319	1,339	1,503	1,744	1,272	1,365	1,085	820	804
Energy:										
Expensing of exploration and development costs for oil and gas	2,980	3,419	3,428	2,639	1,978	519	639	(675)	(400)	(172)
Excess of percentage over cost depletion for oil and gas	2,041	2,656	2,667	1,944	1,771	1,659	1,936	1,030	743	618
Total Energy	5,021	6,075	6,095	4,582	3,750	2,178	2,575	355	343	446

Note: The corporate and individual categories have been combined for all years to give a total. In the energy category, the individual benefits dominate substantially; in FY85, 86, 87, 88, and 89 the corporate benefit is negative for expensing of exploration and development costs.

1/ Presented in constant dollars using an implicit price deflator with 1987 as the basis.

2/ In order to bring these values to constant dollars, implicit price deflators were projected for each based on the historical trend.

Source: Budget of the United States for Fiscal Year 1982, 1983, 1984, 1985, 1986, 1987, 1988, 1989.

presented in the budget accurately report tax costs. However, for the lack of any better data, the values in Table 1-1 were used as a guide but were not considered absolute.

The values presented in Table 1-1 report the total amount of tax benefits to corporations and individuals from FY 1980 to FY 1989 for exploration/development costs for minerals and oil/gas, depletion allowances for minerals and oil/gas, capital gains on iron ore and timber, expensing of multi-period timber growing and investment credit for reforestation. Although the source lists these for corporations and individuals, the tax benefit for resources typically goes to corporations, although this gap has been narrowing over the past several years. Tax preferences for oil and gas are largest for individuals, and in fact in some recent years have been negative for corporations. The major tax preferences have been for oil and gas exploration and development, percent depletion for minerals and oil/gas, and for capital gains or expensing of timber.

This table establishes values for the more well-known federal programs for virgin materials. It should be noted that other programs may be interwoven into the same industries. For example, the Forest Service under the Department of Agriculture and the Bureau of Mines under the Department of the Interior both provide technical support and services to the virgin material industries. Those services and technical support are, of course, funded through taxes. Another possible form of subsidy is below-cost timber sales for timber in national forests. However, a

high percentage of timber preferences is for lumber as opposed to pulpwood for paper making.

So far the discussion has focused on tax benefits for virgin materials. However, it should be pointed out that these same industries also pay additional taxes. The severance tax is probably the most widely-known tax on these industries. It is basically an excise tax levied on either the quantity or value of output. The severance tax, typically levied at the state level, may act as a disincentive for virgin material production. Severance taxes are indistinguishable from production royalties. States with the most easy to reach deposits tend to have the highest severance taxes. These taxes are viewed by states as a means of taxing the most profitable mineral deposits. Therefore, while the mining and drilling industries receive a depletion allowance, they also must pay additional taxes through such programs as the severance tax.

The following sections briefly describe depletion allowances and special treatment of income for the timber industry.

Depletion Allowance

Historically, the depletion allowance can be traced back to the Internal Revenue Act of 1913, when World War I placed heavy demands on the minerals industry. In 1932, percent depletion allowances were extended to all primary metal industries to help them recover from the economic effects of the depression. With World War II, percent depletion was extended to

other nonmetallic commodities.

In each of these cases, it was understood that the tax preferences would likely be repealed after the difficult period ended (i.e., war, depression etc.). But when it came time to give up the subsidizes, the industries fought to keep them. For example, when World War II ended, these industries protested that they were the only class of taxpayer forced to pay higher taxes than before the war. For this reason and their participation in the war effort, the subsidy continued and by 1954 all minerals "except those derived from air" were given a percent depletion allowance.

The percentage depletion allowance enables mineral producers to deduct a percentage, between 5 and 22 percent depending upon the mineral and location (domestic or foreign), of the value of mineral production in computing taxable income from a mineral property. The deduction is subject to a limit of 50 percent of taxable income, computed without consideration of the depletion allowance. The significance of percentage depletion allowance is that the deduction is based on production and does not necessarily bear any relationship to the amount invested.

The basic premise for the depletion allowance is that the natural resources, e.g., oil or gas, deplete over a period of time, just as a production facility depreciates over time. In effect, a depletable resource is capital. Since material resources deplete and cannot be replaced without exploration and development, some provision needs to be made to encourage

industry to seek to replace minerals, oil, and gas as they deplete. This has been the principal basis on which the depletion allowances have been made. The higher allowances reflect cost and difficulty in replacement.

Special Treatment of Income for the Timber Industry

The special treatment of income for the timber industry has historically been called "capital gains." However, capital gains also apply to business and personal assets other than for the timber industry. Due to the scope of this study we will focus on capital gains as they apply to the timber industry. Income from timber can be broken down into two components:

1. real income from the production of timber,
2. income from increases in the price of standing timber.

Both of these incomes qualify under capital gains. It has been argued that annual increase in the value of timber is no different than other agricultural production except for the longer growth period, and thus should be taxed as ordinary income. The timber industry has argued that this longer growing period entails unusual risks and thus the increase in the value of standing timber should receive preferential tax treatment.

The Tax Reform Act of 1986 eliminated the preferential rate structure from capital gains treatment for corporations and individuals. Even though the differential tax rate between ordinary income and net capital gains was eliminated beginning in 1988, capital remains as a concept in the tax law. Thus, due to

other various tax reasons, timber owners may wish to continue to distinguish between ordinary income and capital gains. One such example is their ability to apply only \$3,000 of capital losses against ordinary income, but unlimited capital losses may be applied against capital gains. The Reform Act also lowers the overall tax rates.

Examining the tax costs in Table 1-1 leads one to believe that as costs for some programs decrease for the timber industry others increase. However, through contacts with the timber industry it is unclear why such increases appear. This increase is unclear because these were not new programs or ones established by the Tax Reform Act of 1986.

The first example of a program which appeared to increase tax costs for the government after the 1986 Tax Reform act was the expensing of multi-period timber growing costs. For all other industries (except the timber industry) the Reform Act requires that if production extends for two or more years, the producer must capitalize interest. This exemption allows the timber industry to distribute interest for capital costs, such as planing (a major expense), over the entire production period. Contacts at the Department of the Treasury indicate this income deferral (similar to an interest-free loan) is important in the case of the timber industry because of the extremely long production period (20 to 30 years).

This multi-period expensing for the timber industry is not a new program for it has been in effect for many years. Therefore, it is surprising that the budget reports such tax cost increases in 1987. It should be noted that the multi-period expensing does not apply to annual operating costs such as fire or disease prevention, etc. The annual operating costs, therefore, must be expensed during the year when they are paid. The annual operating costs are typically minimal in comparison to the initial capital costs (e.g., planting).

The second program which appears to increase in tax costs is investment credit and reforestation expenditures. Direct costs incurred by a company to reforest a site for commercial production can be amortized over a 7-year period rather than capitalized and recovered when the timber is cut in 20 or 30 years. These direct costs are also eligible for a special 10 percent tax credit as long as the investments in timber standards are not depreciable. The tax cost jumped from 57 million dollars in 1986 to 210 million dollars in 1987. This is somewhat surprising because the 1986 Tax Reform Act did not change the provisions governing reforestation amortization and credit. And with lower tax rates one might expect the value to decrease. These incentives have been eligible to taxpayers since January 1, 1980 (Public Law 96-451) up to a limit of \$10,000 per year. Due to the relatively small value of the reforestation incentives, it was believed they would primarily benefit small- to medium-sized landowners.

Realizing the potential for questions or disagreements with the Budget figures, one should not allow these values to cloud the issue that Federal programs are in place which benefit the timber industry. The most pronounced programs have so far been discussed; however, other programs that are not easy to quantify also exist. Two such programs are below-cost timber sales and technical support from the Department of Agriculture.

The sale of timber by the Federal government has been under fire for the past several years. The sale of such land has been called below-cost timber sales, to indicate a selling price lower than market value. The argument is that the timber industry receives a form of subsidy because of this special price. The timber industry, on the other hand, stresses that part of the reason for such pricing is the fact that the purchaser must spend additional money, beyond the discounted land price, to improve the land by providing roads and other benefits that then may be used by everyone. Additional work beyond the scope of this study would be needed to fully evaluate this situation.

The last point to be made pertains to the technical support provided by the Federal government to landowners in the timber industry. Through the Forest Service, which is under the Department of Agriculture, various programs are provided to landowners for improving timber management. These programs include such things as fire protection, insect and disease control, and forest utilization/management. While these programs

may be used primarily by small- to medium-sized land owners, the argument is still made that the programs provide a form of subsidy.

EFFECTS OF FEDERAL SUBSIDIES ON MATERIALS RECYCLING

Several studies have analyzed the effects of federal subsidies on materials recycling (see especially References 10, 11, 15, and 16). All of these studies were carried out in the mid- to late-1970s, therefore the conditions of the virgin and recycling industries as well as the changes in the tax codes must be taken into account when examining their conclusions. Although the project team reviewed the methodologies used in each of these studies, it was not within the scope of this study to critically review each methodology. Our goal was to briefly review the methodology, and evaluate how the study has been perceived since its release.

The two initial studies on the virgin subsidies (Booz, Allen & Hamilton (1974) and Environmental Law Institute (1976)) were both carried out for the U. S. EPA and received favorable reviews. The study performed by Booz, Allen & Hamilton assumed impacts on virgin material supply curves are the same as price impacts. This interpretation would only hold true in the case where virgin material supply curves are infinitely elastic. Research, however, illustrates supply curves have an elasticity between one and two. Because of this fact, estimates by Booz, Allen & Hamilton were believed to be overstated by a factor of two. As well, this study relied on interviews with industry

representatives to access the impacts on recycled materials.

The study performed by the Environmental Law Institute did not rely on interviews, but instead based the analysis on an econometric approach on primary and secondary material flows. The models for supply and demand were specific to each material/industry.

The latter reports by the Office of Tax Analysis and JACA Corp. (for the Bureau of Mines) utilized these earlier reports in their analysis. The Office of Tax Analysis and JACA supported the findings from the earlier reports.

The general conclusions of these studies were that while tax benefits for mining and timber growing are substantial, they do not significantly discourage or reduce the use of secondary materials. The studies evaluated the potential effects of tax benefits on virgin materials. These effects are shown in Table 1-2. This table illustrates that the tax benefits affect the price of virgin materials by varying degree. Using the most likely effects, virgin materials subsidies were estimated to affect the price of virgin paper by one percent, aluminum by 5 percent, and steel by 2 percent. Industry representatives have indicated that the subsidies, though taken by all, benefit most those companies that are struggling and less profitable.

The effect of such subsidies on recycled materials has been more difficult to describe. Table 1-3 presents one conclusion of the potential effects of virgin materials subsidies on recycling. The values presented in Table 1-3 reveal that the

Table 1-2

IMPACTS OF TAX SUBSIDIES ON
VIRGIN MATERIAL SUPPLY CURVES

<u>Industry</u>	<u>Upward Shift in Supply Curves</u>	
	<u>Maximum Possible Impact (percent)</u>	<u>Most Likely Impact (percent)</u>
Paper	+4.2	+1.0
Steel	+3.0	+2.0
Copper	+6.0	+5.0
Aluminum	+2.2	-
Lead	+3.0	-

Source: Environmental Law Institute, 1978.

Table 1-3

EXPECTED INCREASE IN RECYCLING OF
SECONDARY MATERIALS WITH SUBSIDY ELIMINATION

<u>Material</u>	<u>Percent Quantity Increase</u>
Waste paper	0.04-0.63
Scrap steel	0.42-2.0
Scrap copper	0.35
Scrap aluminum	1.0
Scrap lead	0.75

Source: Environmental Law Institute and JACA Corp.

anticipated quantities recycled were relatively small (e.g., less than one or two percent) assuming the subsidies on virgin materials were eliminated. In fact, in recent years the real increase in recycling has been significantly higher than these rates independent of the tax differences.

This earlier research has shown that the virgin subsidies on a whole impact the virgin industries by less than 5

percent. It is generally accepted that while most companies may be eligible for the subsidies, industry and government officials indicate those companies which typically benefit the most are the small- to medium-sized ones. With the relatively small impact (less than 5 percent) on the entire virgin industries, it is no surprise that the impact of eliminating the subsidies for the recycled industries would be no greater than one to two percent. This is the value determined through earlier research, yet with the decrease of virgin subsidies due to tax changes the current impact to the recycling industry is less than when the detailed analysis were performed.

To equate the values presented in Tables 1-2 and 1-3, to existing conditions, the research team sought input from industry and government representatives. In selected cases this project team contacted authors from the previous studies which evaluated virgin subsidies. Based on these contacts and changes in the tax structure, the research team reached the following conclusions:

1. Even with the Tax Reform Act of 1986, significant tax benefits are provided to the development of virgin natural resources.
2. The current quantitative effects are difficult to determine from the values in Table 1-1 and the existing conditions of the recycling industry. However,

the quantitative impact today would not be markedly different (and may be lower) than those calculated prior to the Tax Reform Act of 1986.

3. Recycling businesses do not attribute difficult markets to virgin subsidy programs. There are many other pressing economic barriers, such as finished product specifications, consumer preference, and competition from other materials which hinder secondary material utilization.
4. The tax preferences alone for virgin materials do not inhibit increases in recycling today in any significant way. Ways to stimulate recycling should be sought in ways other than elimination of virgin materials tax benefits or alternately, in creating an offsetting or parallel benefit for recycled materials to those applied to virgin materials.

Chapter 1

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Chapter 2

FEDERAL SUBSIDIES FOR RECYCLED MATERIALS

INTRODUCTION

Recycling is a solid waste management alternative. The purpose of this chapter is to examine the possible Federal roles in encouraging more recycling or in revising or restructuring Federal programs that inadvertently inhibit recycling. In this chapter, the focus is on economic policies, including taxes, subsidies and procurement guidelines.

If the levels of recycling are to be increased as a means to reduce disposal volume, the first step is to learn what factors are presently limiting increased recycling. In a recent study on barriers to increased recycling, both economic and noneconomic factors were described.* Economic barriers are factors that limit markets through economic forces. Noneconomic factors include attitudes of manufacturing personnel or of end product consumers, attitudes on quality control, vertical integration into virgin materials industries, and long-standing policies and procedures. Both economic and noneconomic factors are discussed.

* Franklin Associates, Ltd., et al. Michigan Secondary Material Market Development Strategy. Michigan Department of Natural Resources. February 1987.

NONECONOMIC FACTORS

While a free market situation is generally assumed to be controlled by economic factors, this is not entirely true. In some cases, people place value judgments on certain aspects of a business which is not obviously an economic factor. For example, in some important historic trials conducted by state and Federal printing operations, recycled paper was compared to virgin paper. In some of those trials, the recycled paper was more prone to several problems such as paper-feed jamming and overall appearance of the finished product. In subsequent years, many printers resisted the suggestions that they try to use recycled paper in their operations because of a historical negative experience, or rumors of a historical negative experience. In extreme cases, even though currently produced grades of recycled paper have been shown to operate without problems, a prejudice still exists. The price of the paper or other economic issues are not the driving force in the decision in these cases. This discrimination against use of secondary materials has existed in all material industries to some degree.

The discrimination also exists in other ways. Historically, recycled paper products have not been as "bright" as virgin products. Recycled products intended to be white may have a slight gray or brown tint. In some cases, recycled paper has a speckled appearance. Market researchers claim that retail consumers will choose the "brighter" appearing products, even though the other products function as well. While recycled

products frequently cannot be distinguished from virgin products, prejudices still exist in the marketplace.

Another noneconomic factor restricting use of recycled materials is vertical integration. If a manufacturer of products owns virgin manufacturing plants, and also owns the natural resources, they are less inclined to use an alternate source of materials. While economic factors play a role in the decision-making, many companies place a value on simply retaining control of their raw materials. Virgin industries are frequently vertically integrated, thus lessening their interest in manufacturing from secondary materials.

Another important issue for raw materials is what simply may be called "inertia." People tend to resist change. Thus, there is a noneconomically motivated resistance to convert virgin operations to recycled operation, or to even install supplemental or incremental recycling capacity at a virgin operation.

The solution to these noneconomic barriers is primarily communication and education. Federal programs generally do not directly bear on these issues, so they will not be discussed further. One exception is Federal procurement guidelines which may be an important tool in reducing the seriousness of noneconomic factors.

ECONOMIC FACTORS

Economic factors that affect recycling markets include the following:

- * costs of raw materials, capital, and labor
- * costs of transportation
- * new business or capacity expansion decisions
- * end product prices.

These economic factors can be broadly classified as supply-side or demand-side factors. In this report, supply-side factors are those that affect the procurement and processing of raw materials prior to manufacturing. Demand-side factors are those that affect the end consumers of goods, which are industrial and commercial businesses or households. Mills and other recycled materials manufacturing establishments are at the pivot point of the system, being direct participants in both supply-side and demand-side factors.

Each recycled material has a specific set of market factors that affect the degree to which it is used. In each case, recycled materials are limited primarily by demand-side or supply-side factors, or both. For example, old newspapers (ONP) are relatively easy to collect. There is little doubt that many more communities than are presently collecting newspapers for recycling could do so, and many existing programs could collect more. On the other hand, the two primary end products for ONP (recycled boxes and newspapers) are sold to limited markets. Competitive products made of virgin materials serve most of those

markets, and the market share for recycled products has declined in the last decade. Thus, ONP is demand-side limited, and incentives should be applied at that point in the system in order to create more markets.

Demand-side or supply-side limiting factors for secondary materials are shown in Table 2-1. The most likely optimum point in the system for applying incentives is also shown in the table. In the example of ONP, incentives to end users would be most important. Old corrugated containers (OCC), on the other hand, present a different situation. Products made from recycled OCC compete well against products made of virgin materials in many markets. In this instance, incentives to collectors and processors of OCC and to virgin manufacturers to use OCC would likely result in increased use of secondary materials.

Table 2-1

CURRENT LIMITING AREAS FOR MATERIALS RECYCLING
AND APPROPRIATE POINTS FOR APPLYING INCENTIVE

<u>Materials</u>	<u>Limiting Areas</u>		<u>Optimum points for Incentives</u>		
	<u>Supply</u>	<u>Demand</u>	<u>Collection/ Processing</u>	<u>Mills</u>	<u>Industrial/ Commercial Consumer</u>
Old newspapers		X		X	X
Old corrugated containers	X		X	X	
Office papers	X		X		
Mixed papers		X		X	X
Plastics	X	X	X	X	X
Glass	X		X		
Steel cans	X		X		
Aluminum	X		X		
Used oil		X		X	X
Tires		X		X	X

Source: Franklin Associates, Ltd.

One material--plastics--is listed as being both supply-side and demand-side limited. There are many practical problems with postconsumer plastics recycling which need to be worked out at all points in the system.

In this report, the possibility that Federal economic policy may affect supply-side barriers to recycling markets is examined. The history of special Federal tax provisions is first examined, followed by observations and evaluations. Three specific Federal taxes are then examined and evaluated. Direct subsidies are then discussed. Finally, procurement guidelines that are intended to remove demand-side barriers are discussed.

TAX INCENTIVES

Impact of Tax Reductions

To evaluate the impact of any tax reduction on the final demand for recycled products, it is necessary to examine the possible reactions a company might have. The starting point for such an examination is simply that a business person views taxes as neither more nor less than one among the many costs of doing business. The impact of a change in taxes is ultimately indistinguishable from any other price change insofar as the corporate bottom line is concerned.

Thus, the way a company alters its behavior in reaction to a tax reduction will be indistinguishable from the way it alters its behavior in response to any other change in its costs. What is most important is not the intent of legislators or other

policy makers, but rather the range of options a company faces when one of its costs is lowered.

From the public's point of view, on the other hand, there is a significant difference between the impact of tax reductions granted to a firm and the impact of other price changes affecting the firm. Taxes pay for government services used by both firms and individuals. Tax reductions, regardless of their purpose, cause an immediate lowering of total public revenue. This in turn means that public services must be cut, some other tax must be raised, or the deficit must be increased. Hence, it is important in any evaluation of tax strategies to consider the amount of lost revenue in relation to the goal of reducing solid waste going to landfills.

Furthermore, many recycling firms are organized as non-profit corporations and are exempt from most taxes. Other firms, even though organized for profit, have such low taxable earnings --whether because they are experiencing difficult times now, they have various tax-loss carryforwards from the past, or they are already able to take advantage of tax-reducing provisions in the code--that they pay little or nothing in corporate taxes. Reducing taxes cannot alter behavior for either group of firms.

Finally, recent reductions in the corporate income tax rate mean there is less opportunity for special provisions to have a measurable impact. That is, any change from current behavior to increase production or consumption if recycled materials entails an actual dollar cost. A tax break which does not save more than

this total cost, including all related administrative and bookkeeping expenses, cannot justify a firm's incurring the cost. Now that the general level of Federal taxes has been reduced, it is less likely that a future tax break can be large enough to meet this criterion.

These and related issues will be discussed at greater length in subsequent sections. First, however, we present some policy questions related to the use of tax breaks.

Special Tax Provisions and Public Policy

Ever since colonial times, taxes in the United States have been manipulated in efforts to promote desired economic behavior by certain industries (1). The wisdom of using taxes in this manner has long be debated. Some of the principal arguments on each side are listed here since they illustrate the importance of perspective. Some characteristics of tax incentives are cited by proponents as advantages, while those same characteristics are cited by other people as disadvantages.

Arguments in favor of trying to influence economic activity through the tax system include the following:

1. Special tax provisions can be quickly implemented because tax collection procedures are already established.
2. Once enacted, they rarely face further legislative or administrative scrutiny, so that they are not changed or eliminated from one year to the next.
3. Some tax subsidy programs can be designed in such a way that they provide benefits primarily to people or firms who engage in the desired recycling activity, with a minimum of revenue loss due to the awarding of benefits to others who meet eligibility requirements, but do not

increase their recycling activity as much as envisioned by the law's framers.

4. Even if business tax reductions do not have substantial economic impacts, they are useful as symbols that the U.S. government is as favorable to employers as are other nations.
5. Tax provisions entail no visible expenditure and so may be less controversial than proposals of any kind which require direct expenditure or new regulations.

Reasons for not using the tax system to try to affect economic activity include the following.*

1. Staff of the Internal Revenue Service do not have the requisite technical backgrounds to administer a recycling tax incentive program, since numerous regulations will have to be written to define precisely the types of activities that will qualify for tax breaks.
2. Because tax incentives are not debated annually, it is more likely that an ineffective program, one that has outlived its usefulness, or one that costs more than originally projected will continue unobserved.
3. It is difficult or impossible to control the cost of tax break programs. By reducing tax revenue, they increase the budget deficit. The resulting impact on domestic interest rates and the U.S. trade imbalance can have a greater negative impact on all businesses, including recycling, than leaving taxes at their current level.
4. Tax law provisions frequently discriminate arbitrarily, based on the particular tax situation of different firms in the same industry. In general, they create political divisions between new and existing plants, as well as between businesses and individuals. They can also create conflict between the federal government and the states.

* Note that these are general economic arguments which have merit even if it could be shown that special tax provisions actually induce the behavior claimed for them.

5. Even if tax laws did affect economic behavior, their principal impact would be to distort decisions that should be made on grounds other than the seeking of tax benefits.
6. When the government changes tax rates, the value of the tax incentive changes without regard to the particular problem which the subsidy is supposed to address.

It is apparent that a discussion involving only issues of this sort cannot answer the questions of whether or the extent to which the federal tax code should be used to try to promote recycling. Because some of the advantages claimed by proponents of this course are singled out by other analysts as shortcomings, the so-called conclusions of both sides may more appropriately be labeled their starting points. Nevertheless, it is useful to examine one of these issues in greater detail.

The Equity Aspects of Tax Incentives

Any subsidy entails the provision of benefits to some groups and not to others. However, because tax laws cannot be targeted to directly affect some firms and not others in the same industry, they can create inequities among competing groups of taxpayers and among taxpayers within the same industry. In addition, tax subsidies would upset equity provisions built into the current tax law. That is, the law imposes a certain tax liability on profitable firms, but no liability on firms without current profits. This is seen as a matter of simple equity, since the former firms are already more able to pay than the latter. One consequence is a certain leveling of the playing field between the two groups of firms. Profitable firms must

charge a high enough product price not only to cover all production costs, but also to pay taxes, whereas less profitable firms do not face tax costs. This makes it easier for firms facing a temporary decline to weather the economic storm.

Granting tax breaks for recycling would upset this balance among firms in the recycling industries. Tax breaks could only make a difference to firms profitable enough to pay taxes. If they were to take advantage of tax breaks, and if they subsequently reduced product prices, they would put additional competitive pressure on less profitable firms--making it more difficult for the latter to overcome temporary setbacks.

A different type of inequity among taxpayers in the same industry can be illustrated by an investment tax credit for the purchase of recycling equipment. Firms involved in recycling will purchase capital equipment to replace older machines as they wear out or to expand production when and if market demand warrants. An investment tax credit benefits firms which would have purchased equipment for these reasons, even if the credit were not offered. A competing firm that purchased the same equipment before the tax credit was enacted will find itself at a competitive disadvantage because the carrying cost of its capital is not reduced proportionately to the reduced capital cost of its competitor. Thus, firms which are not in a position to benefit from the credit will rightly complain that they are paying taxes to subsidize their own competition.

Furthermore, any incentive that operates by reducing taxable income will also create tension between the federal government and those states which base their corporate income tax on the federal definition of taxable income. This will be especially true for those states in which large recycling firms are located.

Evaluation of Specific Tax Subsidy Programs

All the specific tax provisions considered here can be classified as "supply-side" incentives, that is, they operate by reducing producer costs rather than by increasing consumer demand. The theory behind any such incentive is that the company receiving it will either (a) lower the price for the product it sells, or (b) alter its input mix in favor of recycled over virgin inputs.

Corporate executives will choose option (a) only if both of two market conditions exist: (1) a price reduction will lead to higher sales, and (2) net revenue from the new sales volume will exceed the net revenue that could be obtained by holding prices at their previous level and simply keeping the tax saving as additional profit.

The second condition is often ignored, but it is central to the whole argument, since there is no economic justification for a price cut that does not raise profits. In other words, when taxes or any other costs are reduced, firms need only hold prices constant to experience an immediate profit increase. They will subsequently cut prices only if the resulting increase in sales is so great that it offsets the drop in net revenue per unit

relative to net revenue and sales at their previous levels. This is a much stronger condition than the requirement that the price elasticity of demand be greater than one, but it is the condition which must exist before tax subsidies can have an impact on price, and therefore on output.*

Table 2-2 contains several examples which show how unlikely it is that this condition could ever be met. The numbers are hypothetical, chosen to simplify the exposition; more realistic numbers would involve smaller cost changes and profit margins--making it even more unlikely that tax subsidies could be shown to have an impact.

The first row shows current (pre-subsidy) conditions, e.g., in the paper industry. Suppose that it costs \$90, including taxes, to produce a ton of paper, which is then sold for \$100. If 1,000 tons are sold, gross income is \$100,000, and total profits are \$10,000.

Now suppose a tax cut or other supply side subsidy is introduced and that it reduces production costs by \$3 per ton. This is illustrated in the second row of the table, labeled Post-subsidy case 1. If the subsidy is not passed on as a lower price, the producer still sells 1,000 tons at \$100 each--because now, profit per ton is \$13, yielding total profits of \$13,000.

* A price elasticity demand of one means that some percent decline in price would result in the same percent increase in sales, i.e., a 3 percent decrease in price would result in a 3 percent increase in sales.

Table 2-2

HYPOTHETICAL EXAMPLES ILLUSTRATING THE EFFECTS OF A SUBSIDY ON
PROFITS FOR VARIOUS POSSIBLE CASES

<u>Cases</u>	<u>Production Cost per Unit</u>	<u>Sale Price per Unit</u>	<u>Net Profit per Unit</u>	<u>No. of Units Sold</u>	<u>Gross Income</u>	<u>Total Profit</u>	<u>Net Gain from Pre-subsidy</u>
Pre-subsidy 1	\$90	\$100	\$10	1,000	\$100,000	\$10,000	-
Post-subsidy 1 <u>1/</u>	87	100	13	1,000	100,000	13,000	\$3,000
Post-subsidy 2 <u>2/</u>	87	97	10	1,031	100,007	10,310	310
Post-subsidy 3 <u>3/</u>	87	97	10	1,150	111,550	11,500	1,500
Post-subsidy 4 <u>4/</u>	87	99	12	1,050	103,950	12,600	2,600
Post-subsidy 5 <u>5/</u>	87	97	10	1,300	126,100	13,000	3,000
Post-subsidy 6 <u>6/</u>	88	97	9	1,300	126,100	11,700	1,700

- 1/ Subsidy reduces production cost by \$3 per ton.
2/ Production savings is passed on to customer, production increases by 3/97 or 3.1 percent (elasticity = 1).
3/ Same as 2, but sales increase by 15%, five times the percentage drop in costs.
4/ Same as 2 and 3, but producer retains \$2 of the subsidy, production increases by 5 times the percentage drop in price.
5/ Same as 2 and 3, but number of units adjusted to achieve \$3,000 profit.
6/ Same as 5, but production costs increased by \$1.

Source: Center for Economic Policy Analysis.

This is a net gain of \$3,000 to the producer (shown in the table's last column), but there is no increase in output. Total cost to the Treasury is \$3,000, less any taxes on profits.

Under what market conditions might the tax saving profitably be passed on as a lower price? Post-subsidy case 2 shows that even when the elasticity of demand is one (the full savings is passed on to the consumer and production goes up by the same percent), far more profits can be realized by not reducing the price in order to increase sales volume. It shows price being cut by the full amount of the subsidy, or three percent; thus, profits per ton drop from \$13 to the original \$10. If sales increase by $3/97$ (3.01 percent, elasticity = 1) volume is 1,031. This yields total profits of \$10,310, or a net gain of \$310 compared to the pre-subsidy case, i.e., only about a tenth as much as could be realized by not reducing the price.

Post-subsidy cases 3 and 4 show that even if sales increase five times the percentage drop in price, the producer still ends up with less revenue than if no price or sales change occurs. This is true if only part of the tax saving is passed through to consumers and part is retained by the producer (post-subsidy 4).

The fifth post-subsidy case shows the minimum amount by which sales would have to increase to generate enough revenue to offset the drop in price. This increase in sales is so large, 30 percent, that it is very unlikely that it could actually occur. It is equivalent to a price elasticity of ten, which is many

times higher than anything we have found in any of the literature on the recycling industry.

Furthermore, if demand were to increase by such a large amount as this, production costs would almost certainly increase--as shown in post-subsidy case 6--because capacity limits would be reached and the price of inputs would be preferred over the profit maximizing option of simply keeping the old price level and retaining the tax savings as additional profit.

The second option (option b) for a company receiving a subsidy is the substitution of recycled for virgin inputs. This will be chosen only if both producers, and consumers of the final product are indifferent to the substitution based on noneconomic factors. In other words, producers must not prefer virgin inputs for nonprice reasons, such as technical constraints, and consumers must be willing to buy brands that are made from recycled inputs.

In the paper industry, for example, virgin and recycled products are not always considered equivalent. Some brands of recycled paper are not produced to the same color and brightness standards as virgin paper. In other cases, use of postconsumer waste is avoided because of real or imagined health issues. In these cases, purchasers are biased against recycled products and price is not an important factor in purchase decisions. Tax incentives or any other monetary incentives would not produce the

desired result of increased use of recycled products in these cases where noneconomic barriers are important.

Policy makers who pursue programs designed to achieve option (a) or (b) intend that there should be more products made from recycled materials such as newsprint, boxboard or container glass, for example, with a consequent diversion from landfills of recyclable waste--paper, corrugated, glass and the like. However, the extent to which the necessary markets exist for products has apparently never been carefully considered. General industry studies and our own experience, however, suggest that the conditions often do not hold.

Investment Tax Credits. Investment tax credits (ITCs) allow businesses to subtract a portion of the cost of qualifying capital purchases from their Federal tax liability, thus reducing the net after-tax cost of capital. Most previous research and writing has concerned economy-wide ITCs, such as that enacted in the early 1960s and again in the Economic Recovery Tax Act (ERTA) of 1981. Studies have not been done on ITCs aimed at a particular industry, such as the one in the Energy Act of 1978. Although there are similarities between economy-wide and industry-specific ITCs, there are also significant differences.

Economic models used to justify economy-wide ITCs depend on what is called the "multiplier effect" to generate many of the benefits claimed for investment. This effect is really an indirect impact on demand. For example, suppose the overall level of investment in the economy is increased by an ITC above

what it would otherwise have been. Workers who manufacture the new capital goods will receive additional wages, but they will not spend any of the money on goods which they themselves make. Rather, they will turn to final consumption goods--thus increasing total demand for those products, raising employment in the plants that make them, and "multiplying" the effect of the original investment spending.

The logic behind ITCs targeted specifically to recycling industries is quite different. Such ITCs are not intended to promote the general economy. Indeed, because capital goods manufactured for recycling represent a small fraction of the total U.S. economy, they can cause little or no multiplier effect. Rather their goal is to increase capital formation in recycling firms, on the theory that this will boost productivity and thus create greater demand for recycled inputs.

Two different situations must be carefully distinguished: first, suppose a piece of equipment would have been bought anyway, even without an ITC. With an ITC, it will still be bought; but it will now cost less, in terms of after-tax dollars. Producers can simply pocket the saving as additional profit by maintaining prices at their previous level. If they do so, there will be what economists call a pure deadweight loss to the U.S. treasury, since taxes are forgone with absolutely no new recycling. (For example, see Table 2-2, discussed previously.)

On the other hand, suppose producers do pass on the full saving as lower prices. Suppose further, that the ITC has the

consequence of cutting in half the effective interest rate paid by corporate borrowers for capital equipment. (This is approximately the effect of the Economic Recovery Tax Act of 1981.) In other words, if the nominal bank rate is 12 percent, the after-tax debt payments with the ITC are equivalent to the payments on a six percent loan.

Now suppose a firm borrows to purchase a new piece of equipment. If the nominal interest rate is 12 percent and the debt is amortized over five years, the ITC will have the effect of reducing annual debt payments by 9.6 percent. (On a \$1 million purchase, annual payments will be \$223,959, rather than \$247,687.) If debt on this machine alone accounts for five percent of total production costs, then even if the total saving is passed on to buyers, the maximum price reduction is less than one-half of one percent. This is not likely to increase purchases by any appreciable amount, nor it is even worth the bookkeeping for the firm to change prices by such a small amount.

Moreover, even if prices could theoretically be reduced, they will actually be cut only if doing so will increase total profits. As we saw earlier (in the discussion of Table 2-2), this will occur only if price elasticity is well above one--at levels which previous researchers have simply failed to find. Thus, producers can make more money simply by holding prices at their pre-ITC level and keeping the tax saving as increased profit.

Second, suppose a piece of equipment would not have been purchased, but an ITC now makes its purchase economically

feasible. Even this is not enough to guarantee increased recycling, since the equipment could merely replace previous machinery without leading to any growth in final output. Suppose, therefore, the machine permits an increase in output. The question is whether this greater potential capacity will lead to an actual increase in output, or whether it will simply remain as idle excess capacity. Output market conditions will determine the answer, but it is difficult to imagine the circumstances under which production would increase without associated market development.

If there is unmet demand at current prices, a subsidized investment which increases capacity might be successful provided that the subsidy equals the difference enabling the producer to provide the product at some lower cost and still maintain profits. However, we do not find evidence that this is widespread in recycling industries. At the present time, many recycling businesses suffer from low sales and excess capacity. Frequently markets are being eroded away by virgin products. Thus, their needs are not capital investment in equipment. However, many recycling businesses that are doing well can generate the capital to expand because of revenues generated from sales. In addition, many recycling businesses are labor-intensive, with relatively low capital costs needed for expanded capacity.

On the other hand, suppose all demand had been met at the previous price. This means any increase in production can be

sold only if prices are reduced. But it is economically feasible to reduce prices only if profit margins can be maintained. Since we are analyzing the case in which unsubsidized investment would not occur because it is unprofitable, the subsidy is far more likely to be absorbed by the need to maintain profit margins than it is to be passed on as price reductions. Thus, the ITC subsidy might permit machinery to be replaced a year or more before it otherwise would be; but any increase in capacity is almost sure to result in idle excess capacity, rather than actual higher output.

The preceding conclusions are confirmed when we look at actual historical trends in manufacturing industries using recycled materials. For example, most glass container manufacturers, steel mills, and paper mills are operating with facilities older than ten years. No new glass container plants have been built in the last 10 to 15 years in the United States, and the actual number of operating glass plants has declined over the last several years. (Competition from plastics and aluminum is one reason for the decline.) Firms in the steel industry have also seen a portion of their markets lost to plastics. And although some mini-mills have been built, no new major mills have recently been constructed.

These long-term trends suggest that the lack of investment in recycling industries is unlikely to be reversed by the small change in the cost of investment that could be brought about by an ITC. Of course, definitive estimates of investment behavior

would require a case by case evaluation of individual plants to determine their needs. If an ITC were available, it would obviously become a factor in investment decisions. However, industry contacts have indicated that tax incentives would not be a deciding factor.

Results of Past ITCs. When Congress passed the Energy Act of 1978, the bill included an investment tax credit for the purchase of qualifying recycling equipment. The credit amounted to ten percent of the purchase price of the equipment. The definition of qualifying equipment included "any equipment which is used exclusively to sort and prepare solid waste for recycling, or in the recycling of solid waste" (2). The provision allowed for up to ten percent of virgin material to be used in the recycling process without failing to meet the exclusivity requirement. Also included in the definition of recycling equipment was any machinery used in the conversion of solid waste into fuel or useful energy. The act was repealed in 1980.

Our research has not uncovered any specific evaluation of the effectiveness of the 1978 investment tax credit for recycling equipment. However, we do not believe that the recycling industry is significantly different from other industries that have had ITCs. Therefore, we will examine some of the published research on the impact of the 1981 Economic Recovery Tax Act (ERTA) on investment behavior.

It has been estimated that one effect of ERTA was to cut the cost of borrowing for capital equipment roughly in half (3). In other words, if the nominal bank rate was ten percent, the effective after-tax payments made by firms would be the same as if the money had been borrowed at five percent.

The Deficit Reduction Act of 1982 eliminated ERTA's tax subsidies for certain types of investment and retained them for others. Overall, the impact was very uneven. For some types of firms, the after-tax cost of investment following the 1982 law was higher than it had been before ERTA, while for others it was substantially lower. In any case, the correlation between the reduction in the net cost of capital and business investment was not strong. One example was the large increase in purchases of computers and other office equipment, even though the net cost of capital for these purchases increased (3). In summary, even though the tax law changes did affect the relative attractiveness of certain capital investments, the tax consequences were not the only consideration in business people's decisions.

The U.S. House Ways and Means Committee on the Tax Reform Act of 1985 surveyed the evidence on business's response to ERTA and concluded (4):

Proponents of the massive tax benefits for depreciable property have theorized that these benefits would stimulate investment in such property, which in turn would pull the entire economy into more rapid growth. The committee perceives that nothing of this kind has

happened.

One widely-quoted and influential study of 259 of the nation's largest non-financial corporations found that 44 of them had received such substantial tax incentives that they paid no Federal corporate income taxes at all during the entire four-year period 1981-1984. These were compared with the 43 highest taxed companies, each having paid at least a third of its domestic profits in taxes (5):

The 44 no-tax companies, which enjoyed a total of \$2.1 billion in tax rebates on top of their \$53.6 billion in pretax domestic profits, reduced their aggregate capital spending by 4 percent from 1981 to 1984 and they cut their total number of employees by 6 percent over the same period.

Meanwhile, the 43 highest taxed companies, which paid \$18.2 billion in Federal income taxes on their \$49 billion in pretax profits--for an average tax rate of 37.3 percent--boosted their capital spending by 21 percent and added 4 percent more workers to their payrolls.

The conclusion reached in this and other studies was that, since nothing had happened on the demand side of the equation to justify new investment in plant and equipment, most corporations had simply absorbed the tax savings as higher profits, some of which were either passed on to shareholders in the form of

dividends or used to acquire ownership of other previously separate corporations. Neither use of the tax savings added anything to the nation's productive capacity or to employment, the latter having been the main justification for the original incentives.

If businesses made investment decisions in response to changes in the tax laws, we would expect that fixed investment would have increased after the 1980 ERTA and shown some decline after the Deficit Reduction Act of 1982. From 1980 to 1982, business fixed investment and GNP increased negligibly and from 1982 to 1984 business fixed investment increased almost 11 percent annually (9). The conclusion is that factors other than tax laws, specifically greatly improved business conditions, spurred the increase in capital investment.

In sum, without increases in the demand for products made from recycled inputs, there is little reason to believe that supply-side tax incentives for the purchase of capital equipment will result in increased utilization of recycled materials.

Consumption Credits. This is the name given to programs that attempt to increase the use of recycled materials by reducing the price either of secondary materials or of goods manufactured from those materials which are used as inputs in another productive process. When considered as direct subsidies rather than as indirect subsidies through the tax code, they may be called diversion (or landfill diversion) credits. In order

for a tax-based throughput subsidy to be effective, both of two assumptions must hold:

1. Taxes paid by the target industry must be high enough that credits for purchasing a favored material can actually affect the material's net after-credit price.
2. The primary factor in buyers' choice between new and recycled materials must be price, so that a difference no larger than possible through the tax code will cause them to change their buying habits.

Price Effects. Throughput subsidies can be granted on the supply side to manufacturers who reprocess newsprint, glass bottles, and other wastes, in order to reduce the cost of the wastes they buy. They can be granted on the demand side to the firms that purchase recycled finished goods such as newsprint, bottles, and other goods as inputs into their own productive process. The aim of the subsidies is to reduce the cost of these inputs relative to virgin inputs.

If the credit is given to a manufacturer rather than a consumer, it must be passed on in the form of a lower price, since otherwise demand will not increase and more recycled materials will not be consumed. It is sometimes mistakenly thought that a throughput subsidy can be effective even if the manufacturer simply keeps it as higher profit, on the argument that the manufacturer will substitute recycled for virgin inputs on its own. This, however, assumes that purchasers of the output

are absolutely indifferent about the composition of the product they buy. As stated previously, this is sometimes not true.

The effect of prices of material inputs on finished product prices can be studied by examining existing data series. Historical data for the newsprint industry, the best data that are readily available, indicate that movements in the price of waste paper are not reflected in price movements for finished newsprint at all. Table 2-3 reports price indices for old newspapers (ONP) purchased as inputs at the mill, newsprint manufactured and sold by the mill, and the U.S. Consumer Price Index for urban areas (CPIU), from 1970 to 1985 (1967 = 100). For the first few years of the 1970s, the three indices moved roughly together with one another. After some rapid fluctuations in the mid-70s, the ONP index dropped sharply from its high of 209.6 in 1977 to only 72.1 in 1982, compared to a 1982 CPIU of 289.1. The index for newsprint, on the other hand, rose above the CPIU in 1974 and has remained above it every year since.

In short, the price of ONP has dramatically declined over the long run relative to the price of the newsprint made from it. Thus, the data call into question any program based on the assumption that a reduction in the price of an input would lead directly to a reduction in the price of output.

This lack of correlation between the prices of ONP and finished newsprint is partly due to the fact that ONP is only one economic input to newsprint, and a small one at that--between 5

Table 2-3

RELATIVE PRICES OF OLD NEWS NO. 1
AND NEWSPRINT, 1970 TO 1986
 (Price Indices (1967 = 100))

<u>Year</u>	<u>Old News</u> <u>No. 1</u>	<u>1/</u> <u>Newsprint</u> <u>2/</u>	<u>U.S. Consumer</u> <u>Prices - Urban</u> <u>(CPIU)</u>	<u>Ratio of</u> <u>Old News</u> <u>to</u> <u>Newsprint</u>	<u>Ratio of</u> <u>Newsprint</u> <u>to</u> <u>CPIU</u>
1970	108.1	107.6	116.3	1.005	0.925
1971	103.1	112.2	121.3	0.919	0.925
1972	119.2	116.7	125.3	1.021	0.931
1973	137.2	122.2	133.1	1.123	0.918
1974	201.6	151.2	147.7	1.333	1.024
1975	111.8	184.0	161.2	0.608	1.141
1976	199.5	198.2	170.5	1.007	1.162
1977	209.6	215.5	181.5	0.973	1.187
1978	200.5	226.3	195.4	0.886	1.158
1979	151.8	250.2	217.4	0.607	1.151
1980	167.4	279.3	246.8	0.599	1.132
1981	95.7	308.0	272.4	0.311	1.138
1982	72.1	315.8	289.1	0.228	1.092
1983	NA	303.0	298.4	-	1.015
1984	193.1	323.1	311.1	0.598	1.039
1985	150.0	332.5	322.2	0.451	1.032
1986	137.1	326.1	328.5	0.420	0.993

1/ Price index for postconsumer newspapers purchased by paper mills.

2/ Price index for rolls of newsprint paper purchased from paper mills.

Source: Columns 1 and 2: American Paper Institute, 1987 Statistics of Paper, Paperboard, and Wood Pulp, New York, NY, 1987;
 Column 3: U.S. Bureau of Labor Statistics; Columns 4 and 5: Computations based on Columns 1 to 3.

and 10 percent (by price) in late 1986. The ratio between the prices of cullet and glass bottles is higher, but still small, about 15 percent. Similarly small ratios hold for the steel, aluminum, and plastics industries.

Since it appears that consumption credits are not likely to offset prices, a great deal of attention need not be given to the second condition for success, which is that buyers will choose recycled products if prices are reduced. Nevertheless, there is evidence that this condition is not likely to hold either, at least in the short term.

In the first place, business or final consumer attitudes may prevent consumption credits from achieving much success. People may perceive the quality of recycled inputs to be inappropriate and therefore not use recycled inputs, no matter what their cost. Furthermore, industries such as newspaper publishing are vertically integrated and have substantial investment in the production of newsprint from virgin sources; or at least they have longstanding ties to particular suppliers and manufacturers of newsprint. Indeed, this may be the biggest barrier against any program to increase demand for recycled inputs.

These general observations suggest that resistance to production with recycled inputs is due to factors other than price, i.e., that even if the prices of recycled materials were to decline relative to virgin material-based products, the use of recycled materials would not increase significantly, if at all.

Table 2-4 supports this conclusion for the paper industry. It shows the relative price indices for dried wood pulp sold on the open market and waste paper. While the published price for wood pulp does not truly reflect virgin prices because the vertical integration of the paper industry conceals that data, the price of wood pulp sold on the open market does reflect the price trends for pulp substitutes, the grade of waste paper most competitive with virgin products. The column with the ratio of prices of waste paper to the prices of wood pulp shows a long-term trend downward of waste paper prices. Over the 16-year history, the ratio declined from 1.5 to 0.5, a remarkable decline. At the same time, the use of recycled paper changed very little as shown in the last column. The ratio of recycled paper in the production process remained virtually unchanged--varying between 22.8 and 23.8 percent--until 1986, when it did break out of this pattern. In 1986 it was 24.7 percent, and in 1987, 25.0 percent. There is no doubt that a turn has occurred, but confirmation needs to be made by one or two more years of history.

In short, over a 16-year period the utilization ratio of recycled paper in total paper production has fluctuated over a range of about 1.0 percentage point, despite a long-term trend towards lower recycled input prices. The recent change cannot be attributed to the relative price relationship.

Table 2-4

PRICE INDICES OF WOOD PULP AND WASTE PAPER,
AND RECYCLABLE PAPER UTILIZATION RATIO,
1970 TO 1986

<u>Year</u>	<u>Waste Paper</u>	<u>Wood Pulp</u>	<u>Ratio of Waste Paper to Wood Pulp</u>	<u>Recycled Paper Utilization Ratio</u>
1970	125.0	109.6	1.141	0.228
1971	112.1	112.1	1.000	0.228
1972	133.6	111.5	1.198	0.225
1973	197.4	128.3	1.539	0.235
1974	265.5	217.8	1.219	0.236
1975	110.2	283.3	0.389	0.230
1976	184.9	286.0	0.647	0.233
1977	187.2	281.1	0.666	0.234
1978	191.2	266.5	0.717	0.237
1979	206.6	314.6	0.657	0.238
1980	208.7	380.3	0.549	0.234
1981	175.7	397.1	0.442	0.233
1982	122.8 <u>1/</u>	397.0	0.309	0.237
1983	201.2 <u>1/</u>	346.9	0.580	0.234
1984	240.1	397.6	0.604	0.241
1985	148.8	346.6	0.429	0.238
1986	172.8	358.8	0.482	0.247
1987	219.8	422.5	0.520	0.250

1/ July to December average.

Note: Price indices were adjusted to make 1967=100.

Source: American Paper Institute, 1988 Statistics of Paper,
Paper Board, and Wood Pulp, New York, NY, 1988

This suggests that programs which seek to increase the utilization of recycled inputs by further reducing the relative price of such inputs (whether through the tax system or in any other way) are not likely to meet much success, at least not in the short term.

While data series of other industries are not as easy to analyze, no suggestion is found that low recovered material prices increase recycling. For example, since 1970 the prices of glass cullet have doubled, or tripled in some instances, while the consumption has actually risen. The same is true for aluminum. For steel scrap the prices were deeply depressed for many years with no widespread switches in the industry from virgin to recycled impacts occurring as a result of the low prices. What does seem to occur is that the basic demand for these materials controls the price, not the other way around. The demand is created by complex economic and noneconomic factors, of which the price of the recycled input is a small part.

Research and Development Tax Credits. Innovations that result from an increase in the level of research and development (R&D) spending in response to a tax credit will be successful in meeting the goal of increasing the amount of waste recycled if any one of the following occurs:

1. The R&D results in new processes that lower the cost of producing final goods with recycled inputs; and the saving is passed on to consumers, who in turn increase the quantity of goods purchased.

2. New processes are developed which increase the amount of recycled inputs in a product without changing product quality or price.
3. Technology is developed to recycle waste material that is not currently recycled.
4. New products are developed which use recycled inputs, and these products are not substitutes for other products already made from recycled materials.

In evaluating the likelihood that these outcomes will occur, it is useful to recognize that R&D is really an investment in knowledge. Just like any other investment, it is an expenditure in the present for production in the future. The fact that the payoff is somewhat less certain than when a firm invests in equipment or structures does not alter this fundamental fact.

Therefore, if a tax credit for R&D is to be successful, it must meet the same criteria as any other ITC. That is, it must actually increase R&D expenditures above their previous level, and the results of new discoveries must be put into production. Alternatively, it must reduce the cost of previously planned R&D, the cost saving must be passed on to consumers, and sales must increase as a result. The market conditions under which these criteria will be met have already been discussed in the section on ITCs. If an R&D tax credit is taken for research that would have occurred anyway and prices are not reduced, if the innovations that result from R&D just improve efficiency with which recycled materials are used without increasing the quantity consumed, or if processes are developed which are not put into production, then the tax credit is no more than a loss to the

treasury.

The R&D tax credit in ERTA (1981) was 25 percent for R&D expenditures above the average R&D expenditures in a base period, usually the three previous tax years. This incremental tax credit cost the treasury an estimated \$1 billion per year (5).

How much of the tax loss was due to productive R&D is difficult to determine. Some of the "increase" in R&D resulted merely from expenses being redefined for tax purposes. Also, R&D expenditures had already been rising at a relatively rapid rate before enactment of the credit, so much of the actual increase would have occurred anyway as the trend continued. Rolf Piekarz has summarized published literature on the subject. "These studies concluded that there was no evidence from available research which supported a strong conclusion about the impact of R&D-specific tax incentives on R&D spending (6). Reasons for the apparent lack of success of R&D tax incentives include the small proportion of R&D cost in the total cost of bringing a new product to market. Also, as stated earlier, many firms cannot benefit from any tax incentive because of low or nonexistent tax liability. On average, firms which took advantage of the 1981 credit could only use 59 percent of it in the first year, with the rest being carried forward (7).

One downside of attempts to increase the level of R&D spending by large corporations is that it may result in suppressing new technology. Research has shown that there exist incentives for firms operating in a monopoly or dominant market

position to patent new developments in order to prevent their use by possible competitors (6). This "pre-emptive" patenting or the buying out of firms engaged in competing research activities is used by dominant firms to maintain their market position.

In short, it appears unlikely that a tax credit for R&D for recycling can be a cost effective method of increasing the amount of solid waste recycled. Taxpayer dollars might more effectively be spent on direct subsidies to R&D organizations, such as universities, with a requirement that discoveries enter the public domain if not actually put into production within a specified time after the grant period. This would help achieve the goal of increased recycling by discouraging licensing or other arrangements that permit the licensee to hold a discovery for a lengthy period of time before deciding whether to implement it.

DIRECT SUBSIDIES

Direct appropriated subsidies are one alternate to tax subsidies. For many years it has been common practice for cities and counties to give direct support to non-profit recycling centers or similar operations. Recognizing that these operations divert materials from the waste stream and save tax dollars, governments have been willing to pass on some of the savings to recycling operations to insure continued operation.

The debate about whether direct subsidies are preferable to tax incentives is not complete nor conclusive (13). Some of the merits claimed for direct subsidies are:

1. Direct subsidies can be better administered than tax breaks because the granting agency and the House and Senate oversight committees will have more background and expertise with recycling than does the IRS.
2. Related to the argument above, careful writing of the criteria for inclusion in the subsidy program can permit very accurate targeting.
3. Because subsidies are more visible and it is easier to identify their benefits, it can also be easier to combine them with a simultaneously enacted revenue raising measure to pay for them. It is much more difficult to raise new revenue to offset preferential tax cuts.
4. The appropriation of a direct subsidy is a fixed dollar amount; therefore, the cost to the government is known and can be controlled.
5. Benefits of direct subsidies can be larger than the amount possible through exemptions from taxes, if that is what is necessary to achieve the policy objective. Also, firms that have no tax liability can benefit from direct subsidies. With careful targeting, these outcomes might be achieved at less total cost than the cost of a more diffuse tax subsidy program that provides benefits to firms not engaging in the desired new recycling.
6. The timing of subsidy payments can be made to coincide more closely with firms' needs, compared with tax write-offs that may take many months or years to be realized.
7. The subsidy appropriation must be reconsidered annually, so that an ineffective or inefficient program is more likely to be noticed; it can then be eliminated or restructured to reflect changing conditions.

Direct subsidies, however, are not entirely without problems:

1. As with any other new program, they will generate administrative costs, especially if new personnel must be hired.

2. If not linked with new revenue, they will increase the deficit--just as will tax cuts.
3. There are also likely to be equity effects that even the most informed program administrator cannot anticipate. No matter how closely program criteria are drawn, some firms may qualify that otherwise should have been excluded.
4. Because appropriated subsidies can have a larger impact than tax breaks, it may be easier for some firms to become dependent on them. If a subsidy program is suddenly terminated, these firms may face serious threats to their continued operation.
5. Direct subsidies, since they are more visible than tax breaks, may be more subject to annual attack from unsympathetic lawmakers.

There can be no doubt that the historical use of subsidies at the local level has played a key role in keeping many recycling operations in business, particularly during difficult times. However, no direct subsidies to the demand-side of recycling systems are known, nor are any broad subsidies at the Federal level to recycling industries known.

A key question is whether there is a Federal role to be played in the area of direct subsidies to recycling businesses. No separate analysis is needed on the general considerations of this issue, because the issues raised for tax subsidies are similar, except for the limitations on the size of the subsidy.

Tax subsidies are probably always too small, but direct subsidies can be any size. However, the questions of equity among competitors is a key issue, as well as the basic economic issues of deciding on a supply-side or demand-side subsidy. In addition, a major issue is what the economic effect would be if a

large subsidy were applied. As shown in Table 2-1, possible subsidies to OCC, office papers, glass, plastic, steel and aluminum may be effective on the supply side, while subsidies to ONP, mixed papers, plastics and tires may be effective on the demand side. No data are available, however, on how effective these subsidies would be.

A careful study of these effects would need to be carried out for each material, and for various scenarios of placement of the subsidy in the system. At some level of subsidy, it is probable that recycling would be increased for at least some materials, but the issue of cost effectiveness becomes important.

We believe that direct and carefully-targeted subsidies have a good chance of being successful and cost effective, at least for some materials, but that carefully planned, specific impact studies would be needed to make more definite statements. While analyses of the effect of direct subsidies on individual recycling center operations exist, no careful consideration of direct subsidies for recycling at the Federal level were found. We also reiterate that distinguishing between supply side and demand side subsidies is very important.

PROCUREMENT OF RECYCLED PRODUCTS

To perform their functions, all governments and businesses must purchase materials and services. Governments execute procurements under specific sets of rules, guidelines, or laws established by legislative bodies and administered by selected agencies. The most common method of awarding government

contracts is by low bid. It is not uncommon, however, for noneconomic factors to apply, for example, "Buy American" provisions or affirmative procurement actions targeted to benefit minority or woman-owned businesses.

The following section presents a discussion of government procurement practices for products containing materials recovered from the solid waste stream.

Affirmative Procurement

Affirmative procurement programs for government agencies have several objectives, including establishing standard definitions and guidelines, providing a leadership role, and developing markets for products containing recycled materials.

Definitions and Guidelines. One role of the Federal government has been to establish standard definitions and guidelines. After waiting for guidance from the Federal government on specifications and procedures for procuring recycled materials, many states are now working together and independently on procurement guidelines. Individually, states are developing guidelines that enable recycled products to compete in state procurement activities. States are jointly trying to coordinate definitions and terms, following recent Federal activity in this area.

Current specifications vary from state to state. This causes manufacturers difficulties in supplying products because they cannot economically make small quantities of specified goods containing recycled materials. Consistent specifications by both

state and Federal government agencies would alleviate this problem and enhance the producers' ability to sell products. Federal guidelines can establish standard definitions for state governments to follow, can provide guidelines for local governments to use instead of developing their own, and can provide uniform specifications that are more easily met.

Leadership. In addition to establishing guidelines, the Federal government can provide leadership by purchasing products made from recycled materials as well as requiring contractors to the government to also adhere to the guidelines when using Federal money. The Federal purchases can serve as an example for business and government agencies at the state or local levels, and can have a significant multiplier or ripple effect.

At this time, Federal government affirmative procurement of recycled products has been minimal by comparison to the activity at the state level, although guidelines recently enacted should change this.* (State and Federal activity will be discussed in more detail in the next section.) As Federal programs are implemented, there is a high probability that increased procurement of recycled products by businesses and other government agencies will ensue.

* Paper Procurement Guideline. Federal Register. June 1988.
Re-refined Oil Guideline. Federal Register. June 1988.
Retread Tires Guideline. Federal Register. November 1988.
Insulation Guidelines. Federal Register, August 1988.

Markets. The operating budget of the Federal government is quite large. In 1985, the Federal government was responsible for 4 percent of the gross national product, with governments at all levels responsible for 12 percent of the GNP.* These data along with the knowledge that governments at all levels generate large quantities of paper work leads to a perception that the government is a large purchaser of products that could be made from recycled materials. If this were true, purchases of products containing recycled materials by the Federal government would stimulate markets directly for these materials. Similar purchases by state governments should also help to create markets for recycled materials and thus stimulate recovery. However, a more careful look at Federal government purchases does not bear out these perceptions. Governments purchase services and pay out most of their budgets in salaries. They spend a very low percentage of their budgets on material goods. To illustrate this consider a study conducted for the Federal government in 1978.** It resulted in direct contact with all major paper suppliers of paper products to the government. In all cases but one, government business was less than one percent of each company's total market. Thus, they had no incentive to make

* Statistical Abstract of the United States, 1987.

** Collection of Data Pertinent to the EPA's Development of Guidelines for Government Procurements of Paper Products Containing Recycled Materials, prepared by Franklin Associates for EPA, June 1979.

expenditures to change their technological structure to increase their use of recycled fiber. The one exception was a small paper mill already manufacturing goods from 100 percent recycled fiber. This mill primarily supplied government markets and would provide any percent recycled fiber specified. Thus, they already used as much recycled fibers as possible and government guidelines had little or no potential for increasing their use.

In another part of the same study, it is documented that the Federal government purchases directly less than one percent of the paper manufactured in the U.S. each year, although as much as 3 percent of selected paper products. Indirect purchases add to this total, so that the government is clearly a quite large "single customer" but not a dominant consumer by any measure. Thus the perception that the government has enormous potential to create new recycling markets by direct purchases is perhaps overstated. In fact, to date there is not a single documented case that Federal or state procurements have increased the nation's use of recycled material. Primarily these purchases have resulted in very small increases in recycling or diversion from other markets. However, as procurement guidelines proliferate and more and more purchases are made, the potential for directly increasing recycling will increase, especially when considering the "ripple effect."

The absence of direct effects should not be overstated in importance. The leadership role of government is the crucial issue. Purchasing of recycled products by governments shows by

example how to go about the procurement process and helps to overcome inherent prejudices against these products, thus increasing demand by large numbers of other consumers. Use of recycled products by governments can also demonstrate to consumers that these products perform satisfactorily. This can result in far greater use of recycled products than direct purchases alone.

The effect of government purchases of recycled materials on markets involves two basic issues: whether the products purchased by government can be made from secondary materials, and the extent to which secondary materials are or can be used in these products.

Up to this time, most government programs to purchase products made of recycled materials have focused on products commonly recycled: paper and paper products, lubricating oil, and rubber. There are efforts, however, to expand these categories. For example, some states are reviewing purchases of plastic products to see whether or not products made of recycled plastic can be added to the list.

Identification of products that can contain recycled materials must be followed by a determination of the extent to which postconsumer or secondary materials are or can be used in these products. For example, tissue and toweling products purchased by government agencies likely contain recycled materials already, even without special procurement programs. In other instances, however, existing regulations may preclude

recycled products from being used. In this case, the exclusion may be unintentional, but the regulations may be written so strictly that no substitutions are allowed. For example, Federal highway funding programs are so specific that states are afraid they will lose their funding if they deviate from products identified in the regulations. Failure to mention recycled products as an option will exclude their use. In those cases, special procurement language is needed so that recycled products are not excluded. In other instances, additional procurement language is needed indicating that use of recycled products is acceptable or preferred. Products in this category include tires, printing and writing paper, copy paper, and lubricating oil. Affirmative procurement guidelines for recycled products can encourage their use.

Variations of Procurement Programs

Government agencies all across the country are reviewing their procurement practices. Eighteen states had procurement policies addressing recycled content in 1986, and at least ten others had the issue under study or had introduced legislation.⁴ The number now has grown to 24 that have formal statements favoring procurement of recycled products. These states represent 70 percent of the U.S. population.

The major emphasis, at least initially, in many procurement programs has been on recycled paper products. These recycled products are generally defined as those that contain up to 50 percent secondary materials.

The standardization of specifications or definitions is one area that could improve manufacturers' ability to produce products containing recycled materials. States are actively pursuing consistency with the Federal government's specifications.

Over the years, procurement guidelines for recycled products have generally developed in two forms: price preference and set-asides. The following discussion will focus on these two types of programs at both the Federal and state levels.

Federal Government. The Federal government has issued proposed or final procurement guidelines for these materials: insulation, re-refined oil (lubricants), rubber in asphalt, fly ash in cement or concrete, retread tires, and paper/paper products that contain recycled fibers. Other materials may be considered in the future (Table 2-5). To date, the majority of procurement efforts have focused on paper products; therefore, our discussion will emphasize paper products.

The General Services Administration (GSA) is the purchasing agency for most Federal agencies. Many years ago, GSA purchased paper with recycled content, and administered an affirmative procurement program by requiring recycled content at specified levels for a number of paper products. However, GSA discontinued that program in favor of strict low bid procurement. They cited numerous inconveniences, problems with quality control, and administrative costs.

Table 2 - 5

FEDERAL PROCUREMENT GUIDELINES FOR RECYCLED PRODUCTS

Material	Requirements	Comment
Paper	Grade by grade minimum content standards	Final Rule June 1988
Re-refined oil (lubricants)	Specifications, removal of restrictions	Final Rule June 1988
Rubber (in asphalt)	Congress has requested withdrawal of proposed Rule	Proposed February 1986 (Reaction was very negative)
Fly ash (in cement or concrete)	Specifications, removal of restrictions	Final Rule January 1983
Insulation	Encourage purchases of recycled cellulosic materials, perlite, plastic, and rock wool	Proposed Rule August 1988, Probable Final Rule February 1989
Tires	Recommends retreading of existing tires and buying retreads when replacements are needed	Final Rule November 1988

Paper purchased for the Government Printing Office is purchased by GSA, but under specifications set by the Joint Committee on Printing (JCP). Prohibitions to recycled paper have been removed from paper specifications, but no affirmative procurement program had been pursued.

The Environmental Protection Agency published a guideline in final form for Federal purchases of paper and products in the June 22, 1988 Federal Register. The guideline requires affirmative procurement. The two options provided by the guideline will require either that minimum levels of waste paper content be set for paper and paper products, or that procuring agencies examine procurements on a case-by-case approach to insure that recycled fiber is used to the maximum extent possible.

EPA's recommended minimum content standards are shown in Table 2-6. These recommended standards are included in the guideline to satisfy EPA's obligation to recommend levels of recovered materials to be contained in paper products. EPA has added a column to Table 2-6 to address recovered materials content in cotton fiber content papers.

State Procurement. As was mentioned earlier, there are two basic forms of procurement guidelines: price preference and set-aside. The number of states that have affirmative procurement programs for recycled products is changing at a rapid rate. In 1985 seven states were identified as having purchased paper and

Table 2-6

EPA RECOMMENDED MINIMUM CONTENT STANDARDS OR SELECTED PAPERS AND PAPER PRODUCTS

	Minimum percentage of recycled materials	Minimum percentage of postconsumer materials	Minimum percentage of waste paper ¹
Newsprint.....	..	40	..
High grade bleached printing and writing papers:			
Offset printing.....	..	..	..
Mimeo and duplicator paper.....	..	..	50
Writing (stationery).....	..	..	50
Office paper (e.g., note pads).....	..	..	50
Paper for high-speed copiers.....	..	..	50
Envelopes.....	..	..	(2)
Form bond including computer paper and carbonless.....	..	..	50
Book papers.....	..	..	(2)
Bond papers.....	..	..	50
Ledger.....	..	..	50
Cover stock.....	..	..	50
Cotton fiber papers.....	25	..	50
Tissue products:			
Toilet tissue.....	..	..	..
Paper towels.....	..	20	..
Paper napkins.....	..	40	..
Facial tissue.....	..	30	..
Dollies.....	..	5	..
Industrial wipers.....	..	40	..
Unbleached packaging:			
Corrugated boxes.....	..	0	..
Fiber boxes.....	..	35	..
Brown papers (e.g., bags).....	..	35	..
Recycled paperboard:			
Recycled paperboard products including folding cartons.....	..	5	..
Pad backing.....	..	80	..
	..	90	..

¹ Waste paper is defined in Section 250.4 and refers to specified postconsumer and other recovered materials.

² EPA found insufficient production of these papers with recycled content to assure adequate competition.

paper products containing recycled materials through affirmative procurement programs. States without affirmative procurement programs may also purchase recycled paper, but typically in only very small amounts. Currently 24 states have procurement programs may also purchase recycled paper, but typically in only very small amounts. Currently 24 states have procurement policies addressing recycled content; and 10 others have the issue under study or have introduced legislation. Therefore, the activity in the procurement of recycled products has seen phenomenal growth just in the past few years, but it is too early to determine the effectiveness of these programs. Table 2-7 summarizes the specific state procurement programs for recycled products.

Price Preference. For most government contracts, the lowest bid wins the contract. To enable recycled products to better compete, a price preference has sometimes been established. Preferences are modified open procurements where products with recycled content are preferred. The preference usually takes the form of a bid price adjustment. For example, for purposes of selecting the "low bid," recycled products may be considered as costing 5 to 10 percent less than their actual bid price. Once again, procurement officials sometimes object to this procedure, which interferes with the low bid process.

Currently six states have price preferences for the purchase of paper produced from recycled fibers: California, Connecticut, New Jersey, New York, Oregon, and Rhode Island.

Table 2-7

STATE PROCUREMENT GUIDELINES FOR RECYCLED PRODUCTS

State	Price Preference	Set-aside	Requirements	Comments
California	5% Paper		50% recycled content (10% postconsumer waste)	
Connecticut	10%		Detailed recycled products plan underway	Recycled purchases encouraged by all state agencies
Florida		Paper	None	No enforcement
Iowa			Paper only	Request recycled content in all products
Illinois		Paper	50% recycled content (postconsumer waste)	Pilot program for paper
Maine			Reporting only required	Recycled purchases encouraged
Maryland		Paper	40% of volume 80% recycled content (postconsumer waste)	5% of volume for first 3 years, 25% next 4 years, then 40%
Michigan		Paper	50% postconsumer and secondary waste	Recycled plastics Re-refined oil (under review)
Minnesota				Procure recycled materials when feasible (no enforcement)
Missouri			Paper (and other materials)	No enforcement
New Jersey	10% paper		45% of volume by 1990 (50% secondary waste)	Asphalt, glass, crumb rubber for highways (under review)
New York	10% paper		40% postconsumer waste	Examining additional products containing secondary materials
Ohio			Paper (and other materials)	No enforcement
Oregon	5% paper		50% secondary waste or 25% postconsumer	Other materials preferable but not mandatory
Rhode Island	5% paper		50% secondary waste of which 25% postconsumer	Other materials preferable but not mandatory
Texas			Paper only	No enforcement
Vermont		All products	50% secondary waste for paper	
Washington			50% postconsumer waste; definition includes secondary	In effect for tie bids, paper only
Note: Other states with the issue under study or legislation introduced include:				
Colorado		Nebraska		Pennsylvania
Indiana		New Hampshire		Wisconsin
Massachusetts		North Carolina		

In general, these states have established the price preference at either 5 or 10 percent. Three states offer a 5 percent preference--California, Oregon, and Rhode Island--while New Jersey, New York, and Connecticut each provide a 10 percent price preference.

To better understand the price preference, it is useful to examine its effect on an individual state basis. New York's legislation stems from a statute in 1980. A 1986 law clarified the 10 percent price preference in the original statute. State purchases of recycled paper and paper products have totaled over \$24 million, or 40 percent of the paper purchases. The purchase of recycled paper has comprised between 24 percent in 1987 and 59 percent in 1985 of the total state paper purchases.

The premium paid for the recycled paper has been significantly lower than the maximum 10 percent in New York. For example, in 1986 approximately \$98,000, or one percent of the total paper purchased, was spent due to the preference for recycled, and only \$77,000, or 0.9 percent, was spent in 1987. Therefore, in New York, the increased price paid for recycled paper is considered minimal.

In California, the recycled paper procurement program has been in effect since 1977. A preference is given to recycled products if their bid does not exceed the lowest bid by more than 5 percent. The use of postconsumer waste is encouraged. Contracts are awarded to the bid whose product contains the

greatest percentage of postconsumer waste if the fitness, quality, and price are otherwise equal.

Since initiation of California's program, State purchase of recycled paper and paper products have totaled over \$33 million, or approximately 15 percent of the total paper purchases. On an annual basis, recycled paper has comprised as much as 25 percent of the total paper purchases in 1986-1987 and as little as 4 percent in 1978-1979. The preference or premium paid by the State has been less than 0.2 percent of the dollar value of all paper goods purchased since the program began.

From these two state examples, we observe that recycled paper purchases have been accomplished without large dollar outlays because of the preference program.

Set-asides. Certain classes of products may be "set-aside" and specified to include a recycled materials content; virgin products are excluded. Set-asides are effective at increasing the use of recycled materials, but are often strongly resisted by procurement officials, who object because set-asides may result in products costing more, or they may result in limited numbers of bidders. Some officials also claim that set-asides lead to lower-quality products, resulting from reduced competition, but this cannot be verified.

Three states were identified as having set-asides for the purchase of recycled products: Maryland, Michigan, and Vermont. Maryland has one of the best known set-aside programs, which started in 1977. Since the passage of the law, the State of

Maryland has purchased more than \$17 million in recycled paper products. The law required that the state purchases of paper be 40 percent recycled. Unlike the other states, which report percentage with respect to the dollar amount spent, Maryland reports their percentage with respect to quantity amounts (reams) purchased. Reportedly, they have exceeded their goal.

Set-aside programs do provide that increasingly larger percentages of purchases be of recycled content. Depending on how the set-aside programs are structured, they can impact state purchases in a relatively short time period.

Effectiveness of Procurement Guidelines for Recycled Products

Procurement guidelines promote recycling by expanding markets and improving the attitude of ultimate users by removing restrictive rules or specifications.

The actual amounts of postconsumer recycled materials that are used in products purchased by government agencies may be relatively small. However, the example of a government agency actively purchasing recycled products is noteworthy. This government purchasing creates a market for recycled products and provides a positive example for other jurisdictions and government agencies to follow. Thus, it is not necessarily the size, but the act of purchasing recycled products, that makes recycled procurement such a positive action.

With the preceding observation in mind, assessment of existing programs reveals three points:

- Once programs are adopted, purchases of recycled products are made, and values appear competitive with virgin products (at least at the levels at which purchases have taken place).
- Monitoring and encouragement is necessary for continued program success.
- Since adoption, minimal changes have been noticed by most employees, but specialized employees, such as printers, do notice the difference.

Overall, affirmative procurement programs have shown limited or no detrimental effects on the agencies purchasing the products.

Contacts with state programs have indicated that no direct effects from state procurement practices have been realized through in-state paper mill expansion. State contacts do believe, however, that once standardized specifications are developed, an increase in manufacturing of recycled products will be observed. Those manufacturing operations that expand may not be in the state that has the procurement, but will benefit the entire system.

Role of Federal Policies

EPA has issued four procurement guidelines recently for paper, re-refined oil (lubricants), retread tires, and building insulation. A guideline for fly ash in Portland cement concrete

has existed since 1983. The promulgation of these guidelines covering postconsumer waste fulfills some of the requirements set out in the original RCRA of 1976 for Federal policy in this area. In other words, a decade was required to put them in place. More guidelines are under consideration. Perhaps more testing of products (such as highway construction products) is needed. It is too early to know whether Federal agencies will actually make maximum efforts to increase their use of recycled materials.

Now that some guidelines are in place, required reporting and analysis should take place.

Finally, once these programs are successfully operating, the Federal government should insure that the success of the programs is widely reported. One of the primary advantages of procurement guidelines is the positive example that is provided and the associated educational value. This requires widespread reporting of the programs. The educational value to demonstrate successful use of products aims at the important noneconomic barriers to recycling, while widespread use of guidelines by both government agencies and private businesses can provide economic stimulus through market development and expansion.

SUMMARY

We conclude that tax incentives cannot be effective in increasing recycling levels, primarily because tax incentives are too small to stimulate the sought effects. Also, because of the existence of noneconomic barriers, tax incentives become even more difficult. In some cases, targeted supply-side incentives as subsidies could be effective for the following materials: old corrugated containers, office papers, plastics, glass cullet, tin (steel) cans, and aluminum scrap. The subsidies would need to be greater, however, than the incentives available through tax mechanisms. Targeted direct subsidies would provide the greatest benefit at the lowest cost. Demand-side incentives might increase levels of recycling of old newspapers, mixed papers, plastics, oil, and tires, but here again, they need to be targeted direct subsidies aimed at markets not limited by noneconomic barriers.

Procurement guidelines are currently popular and are being implemented by many states and by the Federal government. Procurement guidelines are uniquely suited for stimulating demand-side markets through ripple effects created by highly visible successful programs. They also help overcome noneconomic barriers by providing highly visible demonstrations of the successful use of products made from recycled products.

The results of this task are summarized in the following nine points:

1. In theory, recycled material tax subsidies would work through the economic system. They would result in lower costs of recycled inputs compared to virgin inputs. They would be successful only if the subsidies increase the volume of recycled materials used through lower end product prices.
2. However, our studies show that tax subsidies will not generally work because the tax liabilities of firms using recycled materials are generally not sufficient to provide the economic stimulus needed to affect purchasing or investment decisions. In fact, many recycling businesses have very low tax liabilities or are nonprofit, making tax incentives ineffective for this group. The subsidies would be regressive to the extent that they would benefit the more profitable enterprises.
3. An examination of price histories shows that lower prices of recycled inputs have not resulted in a competitive advantage over virgin materials inputs in the past.
4. In many cases, price is not the key issue because noneconomic barriers to recycling exist. In those cases, subsidies aimed only at affecting the economics of recycling will not be effective.

5. Recycling industries are not generally limited by lack of access to capital, so investment tax credits are not cost effective.
6. There is evidence that previous tax incentives for other purposes have resulted primarily in increased profits to those receiving them.
7. Tax incentives for R&D spending are not likely to be cost effective in producing increases in recycled material use.
8. A problem with targeted incentives as direct subsidies is the question of equity. By their nature, tax and other subsidies create inequities in competing groups. However, direct subsidies are more cost effective and potentially can stimulate the desired result more so than tax subsidies.
9. Procurement guidelines have recently been promulgated at the Federal level. Their implementation should be pursued, and the results should be widely communicated. Additional Federal guidelines should be considered to broaden the coverage of materials and products.

Chapter 2

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Chapter 3

FEDERAL SUBSIDIES FOR ALTERNATIVE ENERGY SOURCES

This chapter examines the effects of Federal regulations which aid the development of waste-to-energy facilities. The intent is not to evaluate the political issues between waste-to-energy versus recycling. It is felt that an integrated solid waste management approach which includes waste reduction, recycling, incineration, as well as land disposal is necessary to properly handle solid waste. Once accepting that an integrated approach is best it is useful to examine if some alternatives receive greater Federal support than others. Therefore this chapter examines the financial support received by waste-to-energy.

Both the Public Utilities Regulatory Policies Act of 1978 (PURPA) and the Federal tax laws in effect in the early 1980s significantly improved the economic feasibility of waste-to-energy. Small power producers and cogeneration systems are both qualifying facilities under PURPA. A small power producer is any electrical power producing plant not exceeding 80 MW whose primary energy source is biomass, municipal solid waste, renewable resources (i.e., wind, hydro, or solar), or any combination of these. Furthermore, no more than 50 percent of the facility can be owned by anyone whose primary business is the generation or sale of electrical power. This restricts the involvement of electric utility companies.

There is a distinct difference between a small power plant producer and a cogenerator. Cogeneration is defined as the simultaneous production of electrical or mechanical power and heat energy. The thermal energy can be in the form of steam or hot water. On the other hand, a qualifying small power production facility produces only electrical power. Therefore, for a waste-to-energy facility to qualify, they must produce electricity.

PURPA was specifically designed to encourage the generation of electricity by independent producers by removing disincentives. Under PURPA, the Federal Energy Regulatory Commission (FERC) was authorized to establish rules for qualifying plants as cogenerators or small power producers. Furthermore, the regulatory body in each state was given authority to establish rules governing both the sale and purchase of electricity from independent power producers.

The rules establish that a utility company must purchase the electric energy and capacity provided by qualifying facilities. As well, the utility must supply backup and supplemental power if it is requested by the qualifying facility.

The rates paid by utilities for the electricity are generally called the "avoided costs." These avoided costs may vary by state and utility, but should reflect the price the utility would have to pay if it were to generate the power itself or buy the power from some other supplier. The many different ways utility

companies have interpreted this provision have been a subject of controversy since the enactment of PURPA.

PURPA required electric utilities to pay avoided costs for electricity provided from qualifying small power producers. Thus, those waste-to-energy facilities generating electricity could be assured of being able to sell it at a fair price. The Federal tax laws provided several incentives for private ownership of waste-to-energy facilities including an investment tax credit, energy tax credit, and a rapid depreciation schedule. These incentives, combined with the use of tax-exempt industrial development bonds (IDBs), made private ownership of waste-to-energy facilities the preferred approach in most locations.

The Tax Reform Act of 1986 substantially reduced the financial incentives favoring waste-to-energy facilities. The investment tax credit and energy tax credit are no longer available for such facilities being considered today. In addition, depreciation schedules have been lengthened and tax-exempt IDB financing of privately-owned plants has been sharply curtailed. Annual IDB usage in each state is now restricted to the greater of \$50 per resident or \$150 million dollars. The amount allocated for waste-to-energy facilities will vary from state to state but, in general, IDB financing of waste-to-energy projects will probably be quite small.

With the loss of favorable tax treatment for privately-owned facilities, municipal ownership appears more cost effective (1). A municipally-owned waste-to-energy facility is exempt from the

cap allocation on tax-exempt financing (2). Even if bonds sold by a municipality are classified under the Tax Reform Act as Private Activity Bonds (PABs) by virtue of private involvement in the facility, their tax-exempt status remains with municipal ownership.* Should privately-owned facilities be able to obtain tax-exempt financing, private ownership may still be more expensive than public ownership because of added costs attendant with private ownership.

The majority of forthcoming waste-to-energy facilities may well be municipally-owned based on current conditions. In addition to the current economic attractiveness of public ownership, added public risk appears to be little, if any. The financing of capita-intensive waste-to-energy facilities usually requires local government to take on significant risks such that ownership per se has little impact on risk allocation (3).

Assuming municipal ownership of a waste-to-energy facility, the only current tax advantage lies in the issuance of bonds with interest payments to bondholders that are exempt from federal taxation. Tax-exempt bonds may be expected to sell at interest rates of, perhaps, two or three percentage points below comparable bonds that are subject to federal taxation. For a waste-to-energy facility, this may reduce the disposal cost (or

* PABs will not be subject to Alternative Minimum Tax Provisions (2)(3), which may result in federal taxes on bond interest for some bondholders.

tipping fee) by several dollars per ton of waste processed; a rule-of-thumb is that one percentage point in interest rate is worth about \$1.50 to \$3.00 per ton (4).

The use of municipal tax-exempt financing for materials recycling operations is not as clear. It is reported that because some source separated waste materials have value, equipment and facilities used in handling these materials may not be financed with tax-exempt bonds (5). Whereas municipalities are allowed to use tax-exempt bonds for solid waste processing, the handling of materials that are already separated into saleable components may be interpreted as a different activity. As such, tax-exempt financing may be disallowed. This disallowance of tax-exempt financing of capital investments for solid waste recycling would appear to be discriminatory and favoring waste-to-energy over recycling.

The Federal Energy Regulatory Commission (FERC) is the federal agency that defines the rules under PURPA. The preamble to FERC's initial regulations implementing PURPA in 1980 provided that states could set rates for payment to qualifying small power producers (including waste-to-energy projects) in excess of avoided costs (6). Some states, including New York, Connecticut, and Illinois, passed laws allowing electricity rate payments to small power producers in excess of avoided costs.* These laws

* Avoided cost, as defined in PURPA, "is the incremental cost to an electric utility for electric energy and/or capacity that the utility would pay if it were to generate the power itself or purchase it from another source" (7).

were designed to encourage waste-to-energy or other alternate energy projects and they were ultimately upheld by the U.S. Supreme Court.

The State of New York began the process of stimulating non-utility power generation by establishing a minimum 6 cents per kilowatt-hour (KWH) avoided cost rate for qualifying small power producers (8). This rate is reported to sometimes exceed New York utilities' full avoided costs (9).

While requiring electric utilities to pay small power producers, the utilities' avoided costs do not appear to constitute a subsidy, payment above avoided costs would. Tipping fees at waste-to-energy facilities generating electricity will be impacted by the price at which that electricity can be sold. For example, each added cent per KWH at a large-scale municipal solid waste mass-burn facility generating electricity only may be expected to reduce the required tipping fee by \$4.50 to \$5.00 per ton (10).

Thus, utility purchase of electricity from a waste-to-energy facility at rates above the utility's avoided cost is a clear incentive to burn instead of recycle. This is particularly true for wastes with comparatively high heat energy--paper, plastics, etc. These wastes result in greater electricity generation than other wastes, thereby impacting tipping fees at a waste-to-energy facility far more than wastes with low heat energy values.

FERC is currently attempting to prevent states from requiring utilities to pay more than their avoided costs for electricity from small power producers, as in the case of the Orange and Rockland Utilities (11). The proposed regulation is being opposed by many on the grounds that states should have the right to use this means to meet legitimate goals of waste-to-energy, economic development, etc. (6). It is also felt that in many cases waste-to-energy requires this additional subsidy to be efficient.

If FERC is successful in restricting electricity purchase at rates above avoided costs, waste-to-energy and recycling will compete on a more equal basis. If not, recycling may remain at an economic disadvantage to waste-to-energy unless recycling is also subsidized. Proponents are trying to keep rates higher than avoided costs to help the economics for waste-to-energy facilities.

In summary, both the current federal tax structure and PURPA regulations appear to favor waste-to-energy over recycling as far as Federal support. The degree to which this has impacted the relative implementation of waste-to-energy and recycling is not clear. However, the intangible benefits of resource conservation resulting from both waste-to-energy and recycling would seem to favor federal subsidies to stimulate both of these resource recovery measures. As both alternatives are viable options in an integrated solid waste management program.

Chapter 3

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Chapter 4

STATE TAX INCENTIVES

INTRODUCTION

A tax incentive is a provision of the tax code that reduces the tax liability of a specific group of taxpayers for the purpose of introducing them to engage in some activity. This activity is deemed to benefit the other members of society. In the case of recycling, the purpose of tax incentives is to reduce the amount of solid waste being landfilled and promote economical development of recycling industries. The taxes which may be included are gross income, sales, property, or other tax bases. The incentives might be a deduction, exemption, credit or a reduced tax rate.

A key component of incentives is that they benefit only some taxpayers, so unless they directly and quickly cause a sufficiently large volume of new taxable activity, public revenues are reduced below what they otherwise would have been. For this reason, tax incentives are said to generate "tax expenditures," that is, they have the same impact on a budget as if they were new service expenditure items.

The goal in providing tax incentives is to promote the expansion of recycling activities (reuse as well as recovery). Therefore, it is necessary to see that the revenue foregone by the State will produce or be rewarded with the desired outcome of increased recycling markets, and stronger, healthier businesses.

These goals should be obtained in an economical fashion, or, in other words, with favorable cost-to-benefit ratios. Tax incentives can also be evaluated based on whether they are a catalyst in the decision-making process, sway opinions toward positive action, or simply reward actions that would have taken place anyway.

This section discusses the use of various tax incentive programs by other states to stimulate the recovery of recyclable materials. Recycling activities have been eligible for the following tax incentives: investment tax credits, property tax exemptions, and sales tax exemptions. In addition to these programs in place, California has proposed the use of consumption tax credits against income taxes for users of recycled materials.

Every effort was made to discuss programs with State officials and to evaluate the published literature on these programs. A summary of the State tax incentives identified and discussed in this section is shown in Table 4-1. In the following review of tax incentive options, the Oregon programs are described in the greatest detail because they have been in existence the longest and are considered to be innovative and pioneering uses of tax credits for encouraging recycling activities.

Table 4-1

STATE TAX INCENTIVES (ACTIVE AND PROPOSED) 1/

<u>State</u>	<u>Investment Tax Credit</u>	<u>Property Tax Exemption</u>	<u>Sales Tax Exemption</u>	<u>Other</u>
California (proposed)				Consumption Tax Credit
Illinois			X	
Indiana		X		
Kentucky		X		
Massachusetts (proposed)	X			
New Jersey	X		X	
New York (proposed)	X			
North Carolina		X		Income Tax Deductions
Oklahoma	X			
Oregon	X			
	(3 programs)			
Pennsylvania	X			
Wisconsin		X	X	

1/ Because of the rapidly-changing nature of recycling legislation, there may be other active or proposed legislation that was not identified.

OPTIONS AND EXPERIENCE

Investment Tax Credits

Investment tax credits allow organizations that invest in recycling equipment, structures, or land to apply some percentage of their investment against income tax owed. Although this option is an income tax credit, it is commonly referred to as an investment tax credit to reflect the use of the funds. The provisions associated with the various programs differ; however, some states have carryover provisions to account for instances when the tax credit is greater than the current tax liability. Typically, new and replacement equipment are both eligible as long as both are used solely for the purpose of recycling. The following descriptions discuss the various state programs in detail. Table 4-2 identifies the specific provisions of each state's investment tax programs.

Oregon. Oregon has three programs: one associated with energy savings under the Oregon Department of Energy (Business Energy Tax Credit), another operated by the Department of Environmental Quality under the heading of pollution control (Pollution Control Facility Tax Credit), and the third operated by the Department of Environmental Quality for the reclaiming of plastics (Plastics Recycling Tax Credit). Recycling is eligible under each of the first two programs; however, both have broader purposes than just promoting recycling.

Table 4-2

INVESTMENT TAX CREDITS

<u>State</u>	<u>Eligibility</u>	<u>Amount</u>	<u>Comment</u>
Massachusetts (proposed)	- Research & Development of recycled and recyclable materials in manufacturing - Tangible property used in manufacturing	- 50% of R&D costs (100% if performed by institution of higher learning) - 10% of cost in year of acquisition	Available to corporations manufacturing plastic and paper consumer products
New Jersey	Recycling equipment used in transportation, processing, or manufacturing	50% spread over 5 years. May be carried over	Available to corporations only
New York (proposed)	Recycling equipment used solely for processing secondary materials	50%. May be carried over for 4 years	Includes deduction for construction or improvement of recycling facilities
Oklahoma	Installation, purchase, and construction of facilities	20%	Hazardous wastes only
Oregon 1) Business Energy Tax Credit	Equipment used solely for recycling	35% (10% in each of first 2 years; 5% each of next 3 years). May be carried over for 3 years.	Certification is simple and quick. Major state program used by MSW recycling activities. Due to sunset after 1990.

(continued)

Table 4-2 (continued)

<u>State</u>	<u>Eligibility</u>	<u>Amount</u>	<u>Comment</u>
Oregon (continued)			
2) Pollution Control Facility Tax Credit	Equipment, land, and buildings used for recycling	50% spread over 10 years (5% a year). May be carried over for 3 years	Credit will be reduced to 25% in 1989. Due to sunset after 1990
3) Plastics Recycling Tax Credit	Machinery and equipment used solely for reclaiming plastic and making it into a product.	50% spread over 5 years (10% a year). May be carried over for 5 years.	Applies to capital investment made from January 1, 1988 to January 1, 1989.
Pennsylvania (proposed)	Machinery and equipment used to process and manufacture products from post-consumer waste materials.	50% of the equipment cost credit shall not exceed 20% in any year or 50% of the total tax liability.	Does not apply to secondary waste material or demolition waste.

Oregon's Business Energy Tax Credit. Under the auspices of Oregon's Business Energy Tax Credit (BETC), companies are allowed to write off 35 percent of the cost of any equipment used solely for recycling. The credit may be claimed against the state corporate income tax by corporations and partnerships over five years: 10 percent of the equipment value in each of the first two years and 5 percent in each of the next three years. Unused credits from one year may be carried forward for up to three years.

The Oregon Department of Energy (ODOE) can approve tax credits for up to \$40 million in BETC project costs each year for projects that recycle, conserve energy, or develop renewable resources. Five million dollars is reserved for projects costing \$100,000 or less, and individual project costs may be certified for up to \$5 million. This measure prevents a few large projects from capturing the pool. However, a single facility may have several qualifying projects.

Most of the certified BETC projects have not involved recycling, but instead have been other energy-related ventures. The ODOE has certified approximately \$21 million (through March 1988) in recycling project costs for the 35 percent credit since recycling was added in 1981 to the original 1979 legislation. Most of those credits have been granted since 1984. The dollar amounts of credits actually taken against profits is not known since the State does not track the BETC recycling credits from income tax returns. Therefore the impact on the State treasury

cannot be determined. Approximately 180 credits have been certified as of March 1988, for a total project cost of about \$21 million. Therefore, as of that time slightly more than \$7 million (if all projects used the 35 percent credit against taxes owed) could potentially be claimed and lost to the State treasury. However, that would be spread over five years (10 percent the first two years and 5 percent the next three years).

Recently people have become more aware of the BETC use for recycling due to increased State promotion and recycling equipment vendors getting the word out. Applications have increased to about ten a week currently from three to four a month a few years ago. Therefore, the project costs eligible for the tax credit could increase significantly.

The rules for Business Energy Tax Credits define recycling as "a process that changes a given solid waste into a new and different substance. It includes refining used oil. It does not include reuse of a substance in the same way the substance first was used unless it changes the substance."

The following equipment--purchased, leased, or modified--can qualify for the tax credit:

1. equipment used solely to haul and refine used oil;
2. new vehicles or modifications to existing vehicles used solely to transport recyclable materials (such as glass containers, metal, paper, aluminum, and plastic) that cannot

- be used in their present form;
3. trailers, racks, or bins that attach to waste collection trucks for recycling;
 4. balers, crushers, flatteners, separators, drop boxes, and scales.

Shipping and installation costs for qualifying equipment are also available.

The type of recycling business that has had the most credit certifications is garbage haulers. This is because, under Oregon law, all communities greater than 4,000 people must begin to offer curbside collection of recyclable materials. Supermarkets have been the second largest group, primarily for corrugated balers and can crushers. Purchasers of drop boxes have also received many of the tax credits. Some replacement equipment has been certified, but most of the tax credits are for new purchases, since most of the recycling projects are new.

Equipment not qualifying for tax credits includes the following:

1. trucks and bins used both for recycling and waste collection;
2. equipment employed by end users of secondary materials to transport and process home scrap (material generated in the production process);
3. equipment that also handles nonrecyclable materials (e.g., a forklift truck in a grocery store; a delivery truck that also hauls

secondary materials);

4. any equipment--or portion thereof--purchased by use of a government grant. Equipment purchased with a government loan can qualify for credits;
5. resource recovery (waste burning) equipment;
6. equipment purchased but not used in Oregon.

Applicants must get a preliminary certification before "erection, construction, or installation" of the equipment. The applicant must be the owner or contract buyer of the equipment. The applicant must also be the owner, purchaser, or lessee of the business using the equipment, or the lessor of such equipment. Nonprofit organizations are not eligible as they do not pay state income taxes against which a credit may be taken.

It has taken approximately two to three weeks for ODOE to review applications and issue preliminary certification, but turnaround time has currently been reduced to three or four days. Final certification involves verification of actual project costs, either with vouchers or canceled checks (for projects less than \$10,000) or by a Certified Public Accountant (for projects costing more than \$10,000).

ODOE may inspect the applicant's site. In addition, ODOE is prohibited from issuing a final certificate if costs exceed by 10 percent those stated in the preliminary certificate. A hearings process is available for appeal of any certificate denial.

The 1985 Legislature renewed the BETC program for five more years. It is due to sunset on December 31, 1990. There is a great deal of support to continue the program by both legislators and businesses, which have strongly supported the program. At present, extension of the BETC is anticipated, but it will likely be a decision of the governor. The biggest problem seen is that the program takes away revenue from the State treasury.

The 1985 legislature also authorized ODOE to assess filling and processing fees. Applicant businesses pay a nonrefundable filing fee of \$25 for projects under \$5,000 and \$50 for projects over \$5,000. The processing fee is 0.3 percent of the stated project cost, which is refundable if the application is denied. In practice, this would amount to a \$300 fee for each \$100,000 invested.

Projects receiving the tax credit have ranged from a bin costing \$660 to a \$14.3 million waste paper processing system (a deinking facility). Smaller projects have been by far the most common, although four companies account for approximately \$19 million of the recycling project costs eligible for tax credits. Two of the companies have installed facilities to clean and reprocess waste paper. Of the other two projects, one mulches yard debris and waste wood to produce composted products and hog fuel for industrial boilers; the other grinds and pelletizes plastics.

Most of the companies invested in projects costing less than \$30,000. Many of these were for trucks, forklift vehicles,

trailers, and supermarket waste paper balers and can crushers. (Under Oregon's container deposit law, consumers return bottles and aluminum cans to their retail source.)

Equipment investments include loaders, forklifts, conveyors, grinders, shredders, dropboxes, brush clippers, mulchers, compactors, magnets, trommels, screens, scales, trailers, and trucks as well as entire systems for paper separating, cleaning, and storage. They also include a system for plastic pelletizing, blending, and extruding. Plumbing and electrical installations are qualifying expenses for recycling facilities, but land and buildings are not.

Several of the projects resulted in major industrial expansion (in the multi-million dollar range) and it is estimated that all projects combined have created more than 200 new jobs. Approximately one-third of the companies have indicated that their investment hinged on the tax credit.

Criticisms of the BETC have included the depletion of funds by a few large projects. Perhaps in response, the 1985 legislature reserved \$5 million for projects costing \$100,000 or less.

Oregon's Pollution Control Facility Tax Credit. The second program offered by Oregon is the Pollution Control Facility Tax Credit. The program has gone through several changes since its enactment in 1967. At that time, facilities constructed to prevent, control, or reduce air and water pollution were eligible for the tax credit. In 1973, the

legislature made solid waste resource recovery or recycling facilities eligible. Facilities to recover or recycle hazardous waste and used oil became eligible in 1979. In 1985, hazardous waste pollution control facilities were added.

A pollution control facility is any land, structure, building, installation, excavation, machinery, equipment, or device, or any addition, reconstruction, or improvement to such a facility whose sole purpose is to prevent, control, or reduce pollution. Solid waste or recycling facilities are those that use solid waste to produce energy or an end product of real economic value.

The program operated by the Oregon Department of Environmental Quality (ODEQ) has no limit on the individual project or total annual project costs. Project costs must be certified by the State Environmental Quality Commission. Since 1968, the Commission has certified 1,823 facilities with a combined certified cost of \$706.5 million. These certified costs (or an allocated portion) are eligible for the Pollution Control Facility Tax Credit, which is 50 percent applied against State income taxes. The credit may be taken over 10 years at 5 percent per year, or over the life of the facility if it is less than 10 years. It may be applied against corporate taxes, against personal income taxes by individuals, or against property taxes by nonprofit or charitable organizations. At one time, all businesses could apply the credit against property taxes if they chose, but that option was phased out in 1985. Tax credits not

used in any one year may be carried forward for up to three years.

Of the \$706.5 million in certified project costs, \$341 million was declared to be eligible to be taken as tax credits. (The eligible costs may be less than 50 percent because some certified project costs are allocated at less than 100 percent, e.g., a facility may be deemed to be only 80 percent allocable to pollution control. Therefore, the 50 percent tax credit is applied to 80 percent of the certified project cost.) So far it is estimated that the recycling facilities portion of the eligible costs is about \$95 million. As with the BETC, there is no way to determine the actual amount of recycling tax credits that have been claimed against income.

Of the recycling projects certified, \$23.8 million (\$11.9 million would be the maximum amount eligible for use as a tax credit) was for the cost of a single battery recycling plant which is now defunct. The battery plant chose property tax credits (presumably because no income tax was owed), so that would affect the county and not the State treasury. Therefore, about \$83 million would be the maximum impact against the State treasury at present, and that would be spread over 10 years.

Another \$13.3 million was spent by one company for old newsprint deinking. A flat glass recycling plant was certified for \$2 million. Two companies invested a total of \$6.3 million to recycle corrugated containers; however, the program excluded corrugated as a qualifying waste several years ago.

The Pollution Control Facility Tax Credit is not used as much as the BETC, but the projects tend to be much larger and generally require more expensive equipment. Too, this program, unlike BETC, gives the credit for investments in land and buildings. The larger tax credit (50 percent) has appeal for facilities with large capital investments. The users of the BETC generally have much smaller investments and therefore prefer the quicker return (10 percent the first two years), even though the overall credit is smaller (35 percent). It is also easier and faster for firms to qualify for and receive the BETC.

Firms using the pollution control tax credit process a broad variety of materials: asphalt, tires, yard debris and wood wastes, gravel (from concrete aggregate), waste paper, container and flat glass, batteries, plastics, and some metals. The usual array of equipment (balers, conveyors, compactors, grinders, crushers, containers, loaders, etc.), has been purchased under this program. In addition, the tax credit has been used for hog fuel boilers, a lead smelter, a repulping facility, and several building, paving, and excavation projects.

Most of the investment has been for new facilities and equipment, although replacement equipment is eligible. An estimated 100 new jobs were created by new business or expansion related to the recycling project share of the tax credits.

The law was due to expire in 1988, but was extended through December 31, 1990. However, the credit will be reduced to 25 percent in 1989. Extension past 1990 is uncertain.

Oregon's Plastics Recycling Tax Credit. The Oregon Department of Environmental Quality also oversees a program target specifically at the reclaiming of plastics. The program applies only to capital investments made on or after January 1, 1986 and before January 1, 1989.

The income tax credit applies to machinery and equipment that uses at least 50 percent recycled plastic that originates in Oregon and is manufactured into a product. The plastic must be postconsumer or industrial waste, but cannot be an industrial waste generated by the person claiming the tax credit and must be purchased from a plastic recycler other than the person claiming the tax credit. Shredded plastic, regrind, or similar products sold to be made into an end product, does not qualify as a reclaimed plastic product.

The portion of actual costs allocable to the credit may be less than 100 percent if the facility is not solely dedicated to making products from reclaimed plastic. The credit is 50 percent of allocable costs, taken at 10 percent a year for five years. Any unused credit may be carried forward to the next year, but unused credits may not be carried forward after the fifth year.

The credit has a limit of \$1.5 million in certifications annually. In addition, a minimum of \$500,000 of that is reserved for investments costing \$100,000 or less. The maximum cost for any one investment is \$500,000.

New Jersey. New Jersey has recently become the second state to offer income tax credits for recycling projects. The

recycling equipment tax credit is a direct result of the 1987 passage of the New Jersey Statewide Mandatory Source Separation and Recycling Act. The program is overseen by the New Jersey Department of Environmental Protection's Office of Recycling.

The 50 percent tax credit is only available to corporations. It must be taken over a minimum of five years at no more than 20 percent of the tax credit per year. In addition, the credit may be applied against no more than 50 percent of State Corporate Business Tax liability each year. However, the credit may be carried over until it is exhausted.

Transporters and processors of postconsumer waste are eligible. Manufacturers using at least 50 percent postconsumer waste are also eligible. The recycling equipment must have been purchased since October 1, 1987 and used exclusively in New Jersey. The one exception to this requirement is transportation vehicles used to collect recyclable materials. These vehicles must be used primarily (at least 50 percent) in New Jersey, but are allowed to transport recyclable materials out of state.

It is estimated that between 150 and 200 applications will be processed for certification during the program's first year (1988). As of June 1, 1988, 150 applications had been requested from the Office of Recycling and 30 of those returned. The rate of returned applications is expected to increase as the year goes on. Although officials believe it will be at least a year before the impact of the program can be determined, they estimate the fiscal impact could be several million dollars in 1988.

New York (Proposed). A law to provide for an income tax credit for the purchase of recycling equipment was proposed to the New York State legislature this past spring. The proposal calls for a tax credit in the amount of 50 percent of the cost of the recycling equipment. It also provides for any unused portion of the credit to be carried forward for four subsequent tax periods.

Recycling equipment, which must be used exclusively within the state, must be used solely for the processing of secondary materials. Secondary materials include postconsumer material, industrial scrap, and any other material "recovered from or otherwise destined for the waste stream" except for materials commonly generated from and reused within an original manufacturing process. The proposed bill would also offer a deduction for expenditures for the "construction, reconstruction, erection, or improvement of recycling facilities." Whether or not the bill passes (and in what form, if so) remains to be seen.

North Carolina. North Carolina offers what is really a deduction of capital expenses from the tax base rather than a true income tax credit. Corporations in North Carolina can deduct the cost of recycling equipment and facilities, including land, from their capital stock, surplus, and undivided profits in computing their corporate franchise tax. The deduction may be applied over a five-year period or, in other words, with a 60-month amortization on equipment. The equipment and facilities are

also excluded from the property tax base, which will be discussed later.

Approximately 200 facilities have been certified since the program began in 1976. During the first five years of the program there was a rapid growth in the number of facilities. Since 1980, the total number of facilities with certification has stayed around 200. These facilities must be recertified each year. The amount lost to the state treasury through the use of this credit is unknown, but is deemed to be insignificant by state officials.

A survey of recycling businesses in North Carolina disclosed that the credits did not influence most investment decisions. Most projects were operating or well advanced before companies knew of the tax credits. Other economic incentives, including proximity to secondary material sources and markets, were a greater consideration for most of the projects. Some companies indicated that they would have bought recycling equipment anyway. A food store chain with balers for corrugated, for example, also places balers in its outlets in states that do not provide tax incentives.

Several respondents, however, said the tax credit could influence future decisions, especially regarding site locations. One company financial officer said siting decisions often hinged on "the least tax consequences."

Among the certified "recycling projects" are natural and synthetic textile recovery, waste paper reclamation, ferrous and nonferrous metals collection and processing, animal remains used

to make feed, and a proprietary reprocessing of agricultural wastes.

Oklahoma. In May 1986, Oklahoma enacted a tax credit program for the control of hazardous industrial wastes. The Department of Health oversees a program that extends a tax credit of up to 20 percent for the installation, purchase, construction, and use of facilities that recycle, reuse, or destroy hazardous wastes. The economic impact of the program is not yet known, but equipment such as distillation units, incinerators, and storage tanks is expected to qualify for the credit.

Massachusetts (Proposed). Massachusetts recently introduced House Bill No. 1824 to provide tax incentives to encourage the recycling of plastic and paper consumer products. The Act would allow corporations to take a credit against taxes for conducting research and development activities relating to the use of recyclable and recycled materials (plastic and paper) in the manufacturing process. The credit is 50 percent of the cost of the research and development, or 100 percent if the corporation contracts with an in-state institution of higher learning to conduct the activities on behalf of the corporation.

A second part of the Act provides a credit in the amount of 10 percent of the cost of qualifying tangible personal property acquired during the taxable year for use in either the manufacture of recyclable plastic and paper consumer products, or the manufacture of plastic and consumer products from recycled materials.

Pennsylvania (Proposed). Pennsylvania ha recently added an amendment to Senate Bill 528 (Mandatory Recycling Legislation) that would provide an investment tax credit for the purchase of recycling equipment. The proposed credit is equal to 50 percent of the total installed equipment cost. Eligible recycling equipment includes any machinery or apparatus used exclusively to process postconsumer waste materials and/or manufactured products composed of substantial postconsumer waste materials.

Postconsumer waste is defined as "any product generated by a business or consumer which has served its intended end use, and has been separated from solid waste..., but does not include secondary waste material or demolition waste. The amount of credit may not exceed 20 percent of the amount of the total credit allowable and may not exceed 50 percent of the total company tax liability.

Property Tax Exemptions

Property tax exemptions are another incentive used to promote recycling activities. Property tax incentives allow an organization to avoid all or part of the property tax they would normally pay. The exempt property may be equipment, facilities, land, or any combination of these. Sometimes states include these exemptions as part of a larger pollution control program. Property tax exemptions, not specifically targeted to recycling, are often used by states and localities to encourage industrial development and the creation of new jobs. However, reducing property taxes through state-wide legislation often hurts the

local governments who would have received such taxes while having no direct effect on the state treasury. Table 4-3 summarizes the specifics of each state's property tax exemption.

Indiana. The Resource Recovery System Act in Indiana provides an exemption from property taxes for equipment, buildings, and land used exclusively to convert disposable solid wastes and/or hazardous wastes into energy or other useful products. The exemption amounts to 95 percent of the assessed value of the recycling facilities.

Companies must apply for certification each year using a two-step procedure. The first application goes to the Department of Environmental Management for approval of the recycling system. The second step requires petitioning of the county auditor to exempt the qualifying property. About 60 companies have qualified annually.

A company with \$1 million in assessed value would gain about \$33,000 in Indiana. Several companies exceed \$2 million in qualifying assets and an attorney who prepared their applications said he did not know with certainty, but the "bonus money" might go toward expanded operations at some point. He said he did not have any clients who have begun recycling since the property tax exemption was established. He doubted whether anyone would go into the business because of the tax break.

Table 4-3

PROPERTY TAX EXEMPTIONS

<u>State</u>	<u>Eligibility</u>	<u>Comment</u>
Indiana	Equipment, buildings, and land used solely for converting wastes to energy or other useful products.	Large industries are the biggest users; relatively little interest has been shown by MSW recyclers. Manufacturers are the primary recipients of this program
Kentucky	Recycling equipment that contributes to pollution control	Program only available to certain recycling facilities that can demonstrate pollution control
North Carolina	Equipment used for recycling	Some counties' tax bases have been greatly reduced due to large industries receiving the exemption. Equipment used for delivery or shipment does not qualify. Corporations only are eligible
Wisconsin	Manufacturing equipment and processing equipment that "alters material into a different form, use, and name" may qualify	This is a manufacturing-specific program and only through a court ruling were some recycling processors made eligible, and now considered manufacturers according to the definition under eligibility.

Among the qualifying recycling activities are steel and paper mills and waste oil recovery. Household recycling could qualify, but apparently little interest has been shown.

Wisconsin. In 1977, Wisconsin extended to certain qualified recycling firms a 1974 property tax exemption on manufacturing equipment. Qualified firms previously included only manufacturers that met the SIC definitions. The Department of Revenue determines whether a piece of equipment qualifies. To qualify, a processor of paper, fiber plastic, scrap iron, steel, or nonferrous metals must use "large machines" to produce "tangible personal property for resale to the wholesale market." They must alter the material "into a different form, use, and name."

Much dispute, including litigation, has centered on the Department of Revenue's interpretation of the tax code. A state supreme court decision was required to include scrap metal processors in the manufacturing category. The scrap iron, steel, and nonferrous metals industry was able to demonstrate that it did more than simply compact or bale materials "for the convenience of transportation"--a step that does not alone satisfy regulatory language governing manufacturing. For example, paper compactors or balers at collection points (such as supermarkets) do not qualify for property tax exemption. Bales must, at the least, be taken to a processing facility and be opened, shredded or ground, and then rebundled. Sorting and

compacting only qualify if they are part of a more extensive system designed to produce a new substance. Therefore, some paper dealers have not been able to gain the exemption because they do not alter the material "into a different form, use, and name."

Loading equipment has also been an issue. Cranes and forklifts must only load materials into processing equipment to qualify; they cannot be used to take delivery or load goods for transportation out of the plant. Trucks that compact material do not qualify; compaction must be done in the plant by a stationary piece of equipment. Vehicles do not qualify if they leave the plant. The State estimates approximately \$7 billion in assessed value of equipment and land have been claimed since the initiation of the program in 1974. This converts into a property tax savings to manufacturers of between \$84 million and \$126 million during the 13-year period. Recycling's portion of this total is believed to be quite small according to State officials who handle and process the property tax exemptions.

A separate program in Wisconsin concerns waste treatment or pollution abatement of industrial, commercial, and trade waste. While equipment such as electrostatic precipitators is eligible, boilers that burn wood waste and land over which food processing waste is spread are also eligible. Equipment and thus companies that handle residential waste are not eligible for the exemption. The waste treatment program certifies approximately 300 to 400 firms each year for the property tax exemption. Between 1976 to 1987 approximately \$340 million of equipment has qualified, or

roughly \$6 million of property taxes has been saved by industry, but not specifically by recycling companies. State officials indicate that recycling's portion of this total is very small.

One criticism of the program has been that tax officials ignore the intent of the program so as to reduce revenue losses. The criticism continues noting that the department that enforces the legislation isn't the one that proposed it. According to State officials, the recycling regulations have had little effect on the State treasury. The property tax exemption's stimulation of recycling firms has been described as minimal.

North Carolina. Corporations in North Carolina that are certified as recycling facilities receive a property tax exemption on equipment. (This is in addition to the income tax deduction discussed earlier.) Delivery and shipping equipment, buildings, and office equipment are not eligible for the exemption. Approximately 200 facilities are certified altogether.

State officials are not able to determine the annual dollar value of property tax exemptions. The State certifies the facilities, but property taxes are collected (and exempted), in the counties. The officials say the state treasury is not significantly affected by this exemption, which is not surprising since property tax is collected on a local level. However, local counties have lost revenue due to the property tax exemption. In one case, a paper company that constituted 30 percent of a

county's tax base was able to gain exemption. This significantly harmed the county's finances.

Kentucky. Kentucky exempts pollution control equipment from all local property taxes. Some recycling industries can take advantage of this exemption. The Kentucky Revenue Cabinet decides if equipment and facilities qualify, then issues certification. Equipment that typically qualifies is used for air pollution control, water pollution control, disposal or reclaiming of solid or hazardous wastes, sound emission control, and pretreatment of raw materials for environmental protection. It is believed that the exemption of recycling industries has negligible impact on the state treasury. The effect on local tax receipts is unknown.

Sales Tax Exemptions

Sales tax exemptions for recycling equipment allow organizations to avoid paying the state sales tax they would normally pay. States may differ as to allowable equipment. Some only allow exemptions on manufacturing equipment, while others may opt to allow processing and/or collection equipment.

Very few states that offer sales tax exemptions specifically for recycling were identified. Many more states may have programs whereby manufacturers or businesses can avoid sales tax on equipment, parts, and supplies. These could be utilized by recycling operations. Many states also exempt nonprofit organizations from sales tax.

In all the cases examined, no information was available concerning dollar value of equipment purchased, number of facilities purchasing equipment, or amount of taxes exempt. Table 4-4 summarizes the states' sales tax exemptions as they apply to recycling.

Illinois. The Illinois legislation exempts the sales tax for in-line machinery and replacement parts used to manufacture a product. Qualifying machinery is not subject to the state's 5 percent sales tax.

This exemption is intended for manufacturers (using either virgin or recycled materials), but a legal interpretation may make it applicable to other recycling operations. According to the definition given by the Illinois Department of Revenue Legal Department, equipment used in recycling operations that alters the form of the material is eligible for the exemption. This exemption, therefore, could be applicable to recycling processors, such as waste paper dealers, as well as manufacturers, such as paper mills.

(Many other states may also make recycling operations eligible for exemptions under general tax programs. Due to the vast number of such general programs, it is difficult to evaluate every state.)

Wisconsin. Originally, the Wisconsin sales tax exemption was for manufacturers (using either virgin or recycled materials). In 1984, the state exempted collectors and

Table 4-4

SALES TAX EXEMPTIONS

<u>State</u>	<u>Eligibility</u>	<u>Sales Tax</u>	<u>Comment</u>
Illinois	Manufacturing equipment (in-line) and replacement parts	5 percent	Program is not specific to recycling; it is a general tax program only available to those considered manufacturers by significantly altering the state of a material. Many other states may have similar programs.
New Jersey	Recycling equipment	6 percent	Program specific to recycling at both the processor and manufacturer level.
Wisconsin	Recycling equipment and purchase of secondary materials	5 percent	Program specific to recycling at both the processor and manufacturer level.

processors of secondary materials, as well as manufacturers using such materials, from paying the 5 percent sales tax on equipment or on the recyclables themselves. Thus the law specifically allows recyclers such as community recycling centers and scrap dealers to be eligible for this exemption. The Wisconsin Department of Revenue budgets a maximum of \$700,000 per year for the recycling equipment sales tax exemption; however, no in-depth evaluation of the system has been made to indicate how much is actually used. No estimate is available as to the number of companies that have utilized the exemption; however, approximately 500 firms are eligible to use the program in Wisconsin. Therefore, recyclers in Wisconsin can benefit from both the sales tax exemption and the property tax exemption discussed earlier. The overall effect on increasing recycling (recovery and reuse) has been reported as minimal.

New Jersey. New Jersey offers a sales tax exemption to recyclers in addition to the recently-offered investment tax credit. The 6 percent sales tax exemption on the purchase of recycling equipment has been offered since 1981.

Consumption tax Credits

Consumption tax credits are intended to encourage the use of secondary materials by offering a tax credit. Also called secondary materials use credits, they would allow firms using recovered materials in manufacturing to apply a portion of the price paid for those materials as a credit against income taxes owed. Ideally, consumption tax credits would stimulate market

demand for secondary materials by making them more cost competitive with primary materials. The reasoning is that recovered materials are at an economic disadvantage to virgin materials.

There is no state experience with consumption tax credits applied to secondary materials, although California has made several attempts beginning with the 1985-1986 legislative session.

California. California Assembly Bill Number 1109, proposed in the 1985-1986 session, sought to give tax credits to users of recovered glass, paper, oil, and plastics. The materials were required to be recovered and used within the state.

The bill allowed a tax credit against a company's state income tax in an amount calculated as a percent of the amount paid for qualifying secondary material. The percents for each of the four materials named in the bill were:

Glass	15 percent
Paper	10 percent
Used oil	22 percent
Plastics	22 percent

To qualify, a material was to be recovered and used within the state within one year of purchase. The recovered material did not include manufacturing wastes.

The tax credit could be larger in any year than the tax liability, in which case there was a carryover provision. Thus,

it would have been possible for state tax to be completely avoided by the use of secondary materials.

The bill failed to become law in the 1985-1986 session, reportedly because of the inability to develop a funding mechanism. Subsequent versions have also failed.

The latest version, called by some the Recycling Tax Fairness Act (SB 188), is currently up for final approval. SB 188 seeks to establish a separate state tax credit of 10 percent of a taxpayer's purchase cost for secondary materials that are used for producing new products. The act will provide tax credit to industries that purchase recycled paper, glass, and plastics (excluding beverage containers) that are used to make new products. The credits are designed to equalize tax benefits that currently apply only to virgin materials.

Proponents of the bill say it would divert over 300,000 tons of materials from landfills, saving almost 2 million cubic yards of landfill space annually. They also say it would create over 1,400 jobs.

The sponsor of the bill indicated in June 1988 that the chances of passage are not good. Although the bill has survived most of the legislative process, it is now in the Ways and Means Committee, where it will be considered in August 1988. The state has a current revenue shortfall of about \$1 billion, so funding of the bill (which is expected to require several million dollars annually) is again seen as a problem. Even if the bill passes the legislature, it is likely to be vetoed by the governor.

EFFECTIVENESS OF TAX INCENTIVE PROGRAMS

The tax incentives discussed previously are intended to divert recyclable materials from landfills while creating new markets, jobs, and production; attracting investment; and sending a signal of a positive, cooperative business climate to recycling businesses. By some reports, these incentives work well to increase the desired activity. Other views hold that they create a windfall for companies that would be doing the job anyway. In general, it appears that companies with little inclination to incorporate reclaimed material into their production process are not likely to do so just because of tax incentives. Similarly, businesses capable of utilizing secondary materials often do so without tax incentives. Therefore, it is difficult to determine if a significant amount of increased activity has occurred as a direct result of state tax incentives. Investment tax credits are, however, considered a plus or a positive factor by industry when evaluating expansion alternatives.

As states pass mandatory recycling legislation, an opportunity is created for entrepreneurial investment. A potentially large tax credit may make the difference in a decision to invest. One-third of the respondents in an Oregon survey said their investment hinged on the tax credit, and a total of 71 percent said the credit gave their plans a significant push. Oregon recycles 75 percent of its newsprint and actually imports recovered newspapers. Oregon officials cite the approximately \$13 million tax credit to a newsprint recycling

firm as a critical factor. Recipients of tax credits are understandably likely to stress the importance of receiving tax credits. However, the relative importance of a tax credit in investment decisions can be debated; labor costs and proximity to markets are probably more critical factors. In the case of Oregon, a market was created by the passage of legislation stipulating that communities of over 4,000 population offer curbside recycling to their residents. In the Oregon survey, only one-third of the companies interviewed said that the tax credit was essential to investment decisions. Thus, it is possible that the other two-thirds of the companies would have made the investment anyway.

Tax incentives can increase some companies' cash flow and return on investment by reducing operating costs. Tax credits or exemptions on equipment purchases may be important to some firms that collect, process, or use recyclable materials, because these businesses often have marginal profits and limited access to financing. Sizeable tax reductions can help sway the decision of a large operation to locate or expand in a state, although it is likely that other long-term factors such as markets, work force, and costs will have more impact than tax credits. Businesses are more concerned with reducing operating costs because these costs can be significantly large and cost savings are more easily directed toward expanding operations.

Investment tax credits in some cases, however, may not be the appropriate financial mechanism because a firm's taxes may be

too small for tax changes to make a significant difference. Often the problem that a business faces is a lack of current cash flow, so a new or struggling business may not benefit from credits against current or future taxes. In Oregon, \$24 million in investment tax credits were granted to a battery recycling facility that is no longer in business. This was a large portion of the total dollars of tax credits granted in the program. In such cases, where profits are weak or nonexistent, credits against profit-based taxes will actually cost the state treasury little. At the same time, tax credits against a small tax bill or credits carried forward to future years will not help cash-poor companies, and so they cannot significantly increase recycling. Therefore, tax credits granted may not contribute directly to primary goals.

Similarly, sales tax and property tax exemptions may not be a determining factor in investment decisions. Sales taxes are generally a small part of the cost of doing business. In addition, property tax exemptions can have a significant effect on local tax bases when granted to large operations. There is no evidence that sales or property tax exemptions have been a determining factor in a facility's operation decisions for expansion or startup. Although they have probably contributed to some increased recycling activity, their effectiveness as a stimulant to recycling cannot be measured.

Consumption tax credits have not been tried, so there is no example to examine. It is likely that when granted to users of

recyclable materials, they could be effective in making secondary material competitive with virgin materials. This would be a positive step in improving market conditions for reclaimed materials. However, the desired consumption behavior may end if the credit is removed. Therefore, the use of consumption tax credits may result in an extremely long-term program, essentially providing a state-financed subsidy to users of secondary materials in order to maintain desired market conditions. In addition, suppliers of virgin materials would likely compete to maintain their market share.

Thus far, there has been a great deal of variability in the programs adopted by states, both in the types of incentives offered and their areas of application, as shown in Table 4-5. Programs listed in the columns labeled "Recycling Operations" can be described as supply-side incentives since they promote the increased collection and processing of secondary materials. These programs have concentrated on tax incentives for recycling equipment, although some states have chosen to include buildings and/or land. Programs listed in the other column are demand-side incentives, since they promote increased consumption of secondary materials. One can see from this table that there has been no uniform approach in the use of tax incentives, which makes a comparison of programs from one state to another to determine their effectiveness extremely difficult. In addition, the states typically do not know the impact of the incentives on their treasuries or the increase in the amount of recycling.

Table 4-5

STATE TAX INCENTIVES (AREAS OF APPLICATION)

<u>State</u>	<u>Recycling Operations</u>		<u>Manufacturers/Users</u>	
	<u>Equipment</u>	<u>Buildings</u>	<u>Land</u>	<u>of Recycled Materials</u>
California (proposed)				CTC
Illinois				STE
Indiana	PTE	PTE	PTE	PTE
Kentucky	PTE			2/
Massachusetts (proposed)	ITC			ITC
New Jersey	STE			ITC
New York (proposed)	ITC	ITD		STE
North Carolina	PTE			
	ITD	ITD	ITD	2/
Oregon				
- Business Energy Tax Credit	ITC			
- Pollution Control Facility Tax Credit	ITC	ITC	ITC	
- Plastics Recycling Tax Credit				ITC
(continued)				

While it is clear that tax incentives can produce positive benefits, the crucial question is whether the cost-to-benefit ratio is sufficiently low. In other words, the tax incentive costs the state a certain amount of money in foregone revenues and administrative costs, and in return it is expected that the state will benefit in terms of increased economic activity and in increased recovery of materials from solid waste. The answer is that the cost-to-benefit ratio is not known in detail. In general, the programs require little expense to staff and administer. Tax incentives can potentially increase production, employment, export, and material diversion from landfills, thereby increasing taxable incomes and revenues paid to the state. The extent of these benefits has not, however, been documented in operational programs.